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STATE ORGANIZATION FOR WATER RESOURCES MANAGEMENT

George Roy Elmore, Jr.

Georgia Institute of Technology

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16. Abstract

Responsibilities of the states for water resources management have been increasing to meet the needs of the public and the requirements of Federal programs. Georgia is a state with abundant water resources but the minimum attention it gives to water resources management has proven unsatisfactory to those who desire a more comprehensive and coordinated effort. The organizational structure of resources agencies in Georgia has appeared to impede coordination and comprehensive management. While reorganization seems necessary for improved State programs, disagreement exists over the appropriate organizational structure and over the importance of organizational structure to achieving better water resources management. The natural resources organizational structure of Georgia is compared to that of five other states in terms of a research model from public administration theory. An ideal state water resources program is outlined, applied to Georgia's situation, and used to examine the effect of organizational structure on water resources programs. Although available techniques of analysis and data are not sufficient to define organizational structure as cause and program as effect, the structural forms recommended by public administration theory are regularly associated with more highly developed programs. Shortcomings of Georgia's water resources programs which appear to be related to organization are interagency conflict, ineffective leadership from the governor, difficulty in adapting to change, and the omission of programs for water resources planning, flood protection, dam safety and water rights. Possibilities for improvement are discussed. (James - Georgia Tech)

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Abstractor L. Douglas James	Institution Georgia Institute of Technology

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STATE ORGANIZATION FOR WATER RESOURCES MANAGEMENT

By

GEORGE ROY ELMORE, JR.

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SCHOOL OF CIVIL ENGINEERING
in cooperation with
ENVIRONMENTAL RESOURCES CENTER

GEORGIA INSTITUTE OF TECHNOLOGY
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FOREWORD

The work on which this report was based was completed prior to the 1972 session of the Georgia General Assembly. Major changes in State government were made during the session, including the creation of a Department of Natural Resources. Changes in organization, not yet complete, will doubtless have significant effects on the State's management of its water resources. Therefore, certain of the comparisons and conclusions based on Georgia's 1971 State government organization are likely to have been invalidated by the reorganization.

The research on which the report is based was a learning exercise. A major purpose of the research was the development of analytical techniques of general utility. This objective was achieved, and it is for this reason that the report is being published by the Environmental Resources Center.

C. E. Kindsvater, Director
Environmental Resources Center

May 1972

AUTHOR

GEORGE ROY ELMORE, JR., is a candidate for the degree of Doctor of Philosophy in the School of Civil Engineering, Georgia Institute of Technology. His doctoral dissertation comprises the substance of this report. He assumed his present position as Assistant Professor in the Department of Civil Engineering at the University of Kentucky in August 1970.

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SUMMARY

Responsibilities of the states for management of their water resources have been increasing rapidly in the view of the public and under the requirements of Federal programs. The State of Georgia has been among those governments in states with abundant water resources which have given minimum attention to water resources management. As a result the organization of the State's executive branch has been inadequate to meet many current demands for management. The issue by issue response of the State has proven unsatisfactory to those who desire more comprehensive and coordinated water resources management. The organizational structure of resources management agencies in Georgia has appeared to impede progress toward better coordination and more comprehensive management. Therefore many concerned citizens have viewed reorganization as a necessary step toward improved State programs. However there has been disagreement over the appropriate form of organizational structure and over the significance of organizational structure in achieving better water resources management. The objectives of this research are to identify effects of organizational structure of the executive branch of Georgia state government on its functional programs of water resources management so that a more objective assessment of the importance of organizational structure can be made.

The natural resources organization structure of Georgia has been compared to that of five other states with the aid of a research model developed from classical public administration theory. An outline of an ideal state water resources program was developed and applied to Georgia's state and Federal water resources programs. This information was used to test hypotheses about the effect of organizational structure on water resources programs.

It was found that, although the power of the available techniques of analysis and the available data were not sufficient to define organizational structure as cause and program as effect, the structural forms recommended by classical public administration theory were regularly associated with more highly developed programs. Existing and potential shortcomings of Georgia's water resources programs which appear to be related to organization are interagency conflict, ineffective leadership from the governor, difficulty in adapting to change, and the omission of programs for water resources planning, flood protection, dam safety, and water rights. Possibilities for improvement of Georgia's organization suggested by the organization of other states are discussed.

CHAPTER I

INTRODUCTION

The purpose of this study is to determine how the organizational structure of state government in Georgia affects the performance of functional programs of comprehensive water resources management. Significant institutional factors which impede development of more satisfactory programs are identified.

Water Resources Management in the United States

Complex interrelations among physical and social systems in the modern industrialized society of the United States are becoming more evident to the general public through the disclosure of realized or predicted ecological disasters. A concern for these interrelationships as expressed through the history of comprehensive management of American water resources, however, is not such a recent development. An early classic document of American water resources, the 1808 report on roads and canals by the Secretary of the Treasury, Albert Gallatin, recognized the interrelationship of navigable waterways with the commerce, growth, and security of the nation. Later, the remarkably perceptive Report on the Lands of the Arid Regions in 1878 by the explorer of the Colorado River and the Grand Canyon, Major John Wesley Powell, clearly identified the dependence of western economic development on careful use of water for irrigation. The Reclamation Act of 1902 incorporated these ideas and made the use of water for development of the West a national policy.

Shortly after the turn of the Century, when the conservation movement had developed enough to involve President Theodore Roosevelt, notions of the interrelations of forests, soils, and water were becoming widespread. The objective of development for multiple uses had found a permanent place in water resources planning. By 1933 Hoover Dam had paved the way for future Federal multiple purpose water developments, and the TVA act (1933) had firmly established the use of the river basin as a planning and administrative unit. Multiple-purpose river development on the Tennessee meant navigation, flood control, and hydroelectric power production. But the mission of TVA was broader than river development, and it became an experiment in the use of resource development to achieve social ends, which increased planners' awareness of these relationships.

The National Resources Planning Board and its predecessors (1933-1943) drew attention to "comprehensive" resources planning, and the Flood Control Act of 1936 led to the use of economic criteria for justification of Federal projects through the development of cost-benefit analysis. The Soil Conservation Service was established in 1935 to deal with erosion and other land-water problems of farmers. A renewed public works program after World War II intensified interest in economic evaluation of Federal water projects from the national viewpoint. "Comprehensive development" began to take on added dimensions as municipal water supply, waste water dilution, and recreation joined navigation, irrigation, flood control, sediment control, and hydropower among the multiple uses. Today project evaluation is increasingly based on choices among a broader range of alternatives, including non-structural ones, and on consideration of the water and related land and human resources. Cost-benefit analysis is being joined by parallel analyses of non-market effects. It is recognized that decisions based primarily on economic evaluation have not been sufficient to serve needs which have no established market value.

As various Federal agencies began planning comprehensive water resource development projects, interagency conflicts became more frequent. Some interagency coordination and cooperation was achieved through adoption of uniform methods of analysis and the establishment of interagency committees for coordination. The interagency committee evolved until, in 1965, the Water Resources Council was established as a permanent agency to coordinate nation-wide planning for water resources development. Interagency conflict also produces perennial proposals for reorganization of the Federal agencies concerned with water resources development. Such proposals, for example, often suggest the formation of a Department of Natural Resources. President Nixon has recently acted to form the Environmental Protection Agency* which appears to have aroused less protest than have proposals for a more comprehensive Department of Natural Resources. The National Water Commission established by Congress in 1968 to conduct a five-year study of ways of meeting U.S. water requirements in the future is expected to make recommendations about Federal organization and about Federal-state relations affecting water resources.

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*An Environmental Protection Agency was recommended by the President in Reorganization Plan No. 3, July 9, 1970, and became effective on December 2, 1970, with the concurrence of Congress and the confirmation by the Senate of its administrator.

Federal water resources management programs have shaped state programs and organization in significant ways. Uniformity among states has been promoted by Federal incentives and requirements, although great differences among the states still exist because many other factors also influence their programs and organizations. The level of state activity has been increased in many program areas by Federal incentives, and the focus of state programs has been constrained by Federal programs and policies. This uniformity in the patterns of water resources management programs makes meaningful interstate comparisons and evaluations possible.

Water Resources Management in Georgia

Historically, the State of Georgia has responded to changing demands on its water and related resources on an issue by issue basis. The result has been a proliferation of programs with narrowly limited purposes, created and operated under an incomplete framework of law, policy, and organization and lodged in numerous agencies with diverse primary functions. The abundance of Georgia's water resources and an historical pattern of infrequent floods, droughts, and water quality crises help explain a lower level of concern and action in Georgia than in states with more severe water problems. Georgia's current needs in water resources management are largely those of anticipating problems and opportunities and preparing to meet the problems and develop the opportunities for the benefit of the State.

As is common in state governments, Georgia has established numerous single purpose agencies in related fields to deal with water resources issues as they have arisen over the years. Unlike the situation in some states, crises involving natural resources, particularly water, have not been so severe in Georgia that the need for coordination of these programs has been an effective imperative for structuring the organization of state government. Nor have other possible imperatives for organization, such as economy and efficiency of operation, principles of classical organization theory, or influence of professional groups been effective in achieving coordinated reorganization. A series of reorganizations affecting the functions of forestry, geology, public health, parks, and fish and wildlife took place between 1931 and 1943 with the net result that each function continued to operate independently of the others.

The drought over the southeastern states in 1954 prompted soil and water conservation interests to press for the passage of water legislation by the states. In 1955 the Georgia legislature established the Georgia Water Law Revision Commission to recommend State action. In 1957 the legislature acted: 1) to establish a Water Resources Commission to direct the work of a State Water Survey under a state water engineer, and 2) to improve the water quality control program in the State Health Department through the formation of a Water Quality Council composed of representatives of special interests and ex-officio State agency members. The water quality act provided that the members of the Council would also serve as the Water Resources Commission. A state water engineer was never appointed; the State Water Survey was never established. Only the water quality control program was ever implemented, but it also remained ineffectual.

Dissatisfied with the water pollution program, the legislature in 1964 repealed the 1957 law and enacted the Georgia Water Quality Control Act, under which a more active water quality control program has been developed. This act also repealed the legislation of 1957 which called for the creation of a State Water Survey and the development of programs of water resources planning and coordination. As a result groups of citizens who remember the drought and recognize various weaknesses of the State's water programs, have attempted since 1964 to have the legislature establish an effective comprehensive water resources agency for planning and coordination. In 1967 the legislature adopted an act creating the State Planning and Programming Bureau, whose authority appeared to duplicate in some respects that of the proposed water planning agency. The Planning Bureau began a study of water resources planning needs in 1968, which produced a proposal for a water planning program that has not been implemented. In 1970 new, vocal conservation interests, encouraged by the Water Quality Control Board, opposed the proposed water resources planning act on the grounds that it would interfere with the program of the Water Quality Control Board. Thus the efforts of the proponents of a State water resources planning agency to date have been ineffective.

As Georgia's water resources have not suffered frequent crises of drought and flood, water pollution has become the single most widely recognized problem, and the Water Quality Control Board has responded vigorously. It is apparent that the proponents of comprehensive water resources planning and management have until now failed to convince the public of the need for more than water quality control. But the situation is changing. Environmentalists are becoming better informed of the need for coordinated action in resources management. Additionally, the Federal Government has initiated controversy through actions concerning pollution of the Savannah and Chattahoochee Rivers, extension of the Okefenokee Swamp preserve, and the development of the coastal islands. Gubernatorial candidates made environmental quality an issue during their 1970 campaigns.

Even without the occurrence of a water crises, water resources as a factor in environmental management is receiving increasing public attention in Georgia. It would appear that some reorganization of the State's water resources programs is imminent. A more complete understanding of the State's organizational needs for water resources management is thus a timely objective.

Research Objectives

The objectives of this research are to identify effects of the formal organizational structure of the executive branch of Georgia state government on its functional programs of water resources management and to develop tools and methods of research which can be applied to other states so that methods of comparison can be used to test propositions about these effects.

The executive branch has been selected for study because it is here that a state's substantive programs of water resources management are carried out by engineers and other professionals. Formal structure has been selected as an aspect of organization which often receives more attention from those who seek to reform or improve program operation than is warranted by current understanding of its significance. This study aims at making expectations about the effects of formal structural change more realistic.

Executive branch programs and organization for natural resources management have been made the focus of the study because in a number of state governments the basis for departmentalization of programs has been natural resources rather than water resources. Typically in the humid states water resources has been a less obvious focus for state government organization than it has been in the arid states. Furthermore, the interactions between water and other natural resources management programs are too intimate to allow a natural separation of water from related resources. Such a scope is consistent with the objective of considering comprehensive water resources planning and management.

The selection of the executive branch for study and the lesser attention given the legislature and the governor's office are the result of narrowing the focus of the study, not of any demonstration that the executive branch is significantly more worthy of study. A more complete model for study of governmental structure would include other components of government and would consider both formal and informal aspects of structure. Of particular significance would be the influence of the Federal government.

Additional influences external to governmental organization which probably have significant effects on organization have not been considered. These influences comprise the external constraints on organization, including geographical, social, political, and economic characteristics of the state.

Another objective of the study is to develop research tools to quantify organizational characteristics in a uniform way and thereby gain the substantial advantages of making case studies readily comparable. Lack of comparability is a common shortcoming of traditional case studies.

Any case study of an administrative organization might be expected to judge the effectiveness of the organization in achieving specified goals. Such judgments are not the direct objectives of this study, although it is intended that the results will contribute to the understanding of how such judgments can be made in a rational way. Rather than testing direct relationships between organizational structure and effectiveness, this study tests relationships between structure and certain variables which intervene between structure and effectiveness. These variables are influenced both by structure and by organizational characteristics not studied here. Thus the objective of this study should be viewed as improved understanding of selected relationships imbedded within a complex model of organization which has been only partially described.

Research Methods

The purpose of this study is to determine how the organizational structure of Georgia state government affects its water resources management programs. The approach taken was to formulate expected effects as hypotheses and then to test the hypotheses with available data in order to confirm or deny them. Tests were of two general types: 1) weighing of data about Georgia to determine whether the hypotheses are supported or contradicted, and 2) comparisons of Georgia's organization and programs with those of other states.

The formal structures of the natural resources organizations of Georgia and five other states have been described systematically and quantified to simplify comparisons. A normative research model of organizational structure was developed from principles of traditional public administration theory, and the deviations of each of the six states from this ideal were measured. Using this deviation to represent formal structure as an organizational characteristic, it is possible to determine whether formal structure is correlated with other characteristics of the natural resources organizations of the six states and with factors which are expected to influence the organizations. A poor correlation between formal structure and a comprehensive measure of organizational efficiency could indicate that formal structure is unimportant to effective organization. Unfortunately no good measure of efficiency has been developed and such evaluations must be made using imperfect and indirect measures.

In order to judge the adequacy of the water resources management programs of the State of Georgia an idealized outline of a complete state water resources program was developed as a standard for comparison with Georgia's program. By determining whether or not the State conducted a program in each suggested area, a measure of the breadth of coverage and the identification of general areas of weakness and omission were made. Program areas of possible inter-agency conflict were identified where overlap and duplication occurred. Areas of program strength were also made evident. This technique does not evaluate the quality of individual agency programs, but it does provide a comprehensive framework for comparison and evaluation of variations among programs.

Data on Georgia's water resources management organization and programs were collected from the Georgia Code, annual statutes, the annual reports of State agencies, reports of the State auditor, interviews with agency personnel, and the published literature concerning Georgia law and government. Data from other states were more limited. State codes were consulted for legal data. Reports of state agencies and the current literature on water and other resources yielded additional information concerning organization and programs.

Selection of States for Comparison with Georgia

In order to better understand Georgia's problems, to reveal alternative organizational structures, and to allow the testing of hypotheses through comparisons, five other states were selected for study. The states selected--Florida, North Carolina, Wisconsin, California, and Kansas--were known to have more fully developed state water resources management programs than Georgia. Additionally, these states represent a variety of geographical water resource situations which have affected the development of their water management programs.

Of the five states, North Carolina is most similar to Georgia. Both states have Atlantic coastlines with offshore islands and coastal swamps and marshes. The coastal plain, piedmont, and mountain provinces of the Southeast divide both states into similar physiographic and climatological regions. The two states are of similar size as measured by area and population. In national politics both states are characteristically "Southern," but North Carolina has had a reputation for more progressive state government than have other Southern states. Georgia has a slightly higher per capita income and a more urbanized population. Despite the many similarities between the two states, North Carolina has had a Department of Water Resources with a relatively broad range of authority since 1959. The experience of a sister state with many similar problems should be useful for understanding Georgia's problems.

Florida, another state which borders Georgia, has been very active in planning and developing its water resources. Though also a Southeastern state, Florida's geography makes water a much greater concern there than in other states of the region. Lengthy Atlantic and Gulf coastlines and extensive inland waterways, lakes, and swamps have made its water problems obvious. The development and control of water in southern Florida has been a controversial issue for decades. Much of the agricultural and urban land of the State has been reclaimed through drainage or fill. Navigation, sport and commercial fishing, irrigation, land reclamation, ground water supply, recreational water use, beach protection, and flood control have been much more vital problems for Florida than for most other states. Her response to water resources problems has had to come much earlier than has Georgia's. Florida's water resources problems might serve as a preview of many of Georgia's future problems.

Wisconsin is similar to Georgia in area and population, and both are water-rich states. However, earlier industrialization of Wisconsin has resulted in more intensive development of her water resources. Although the water law of both states is based on the riparian doctrine, Wisconsin has developed a much more extensive range of legal and administrative controls over private property rights in water and shoreland than has Georgia. The administration of these controls has contributed to the development of a comprehensive state water resources management program. Because of the similarities between the two states, the Wisconsin organization is useful as a highly-developed example for comparisons to Georgia.

Kansas suffered successive years of flood and drought during the early 1950's which provided incentive for the formation of the Kansas Water Resources Board to coordinate the water resources planning and management programs of several existing state agencies. The Board has carried out its mission effectively without reorganization of the existing agencies. This form of organizational arrangement has been proposed for Georgia, and it is therefore of interest to study a successful arrangement of this type.

California has the largest water resources management program of all the states. It has taken the initiative for large scale water resources development away from the Federal Government and has proceeded with the $3 billion State Water Project which was developed by the California Department of Water Resources. The huge size of this undertaking indicates the importance of water in California and the degree of the State's commitment to meeting its water problems. The water resources management organization of California represents an extreme with which to contrast Georgia's comparatively meager organization.

CHAPTER II

FORMAL STRUCTURE OF STATE NATURAL RESOURCES ORGANIZATION

Kaufman (1)* has suggested that in the evolution of American state government structure, a search for accommodation among three values has been a persistent characteristic. The three values are representativeness; technical, non-partisan competence; and leadership. The first value, representativeness, has been sought through the popular election of public officials, extension of voting rights to an ever larger share of the governed, and other devices such as administration by boards rather than single executives. Technical, non-partisan competence has been sought through the development of civil service and merit systems and related ideas. But it is the third value, leadership, which has been most intimately connected with the concern for organizational structure. The impressive historical achievements of American industry have been attributed largely to excellence of executive leadership applied through effective organization. This industrial success has inspired the study of organization in attempts to develop theories which can prescribe ideal organizational forms for industry and government. However, an organizational form adopted to foster one of these three values has sometimes conflicted with the pursuit of the other values. Which is more desirable, administration by representative boards or by appointed executives? Should executives be appointed by the governor or selected under a merit system? Resolution and compromise of such issues has been one significant objective of organization theory.

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*Numbers in parentheses refer to items in the portion of the bibliography entitled "Literature Cited."

Organization Theory

Classical Management Theory

Management as a field of study is described by Massie (2, p. 387) as immature because a comprehensive general theory has not been developed. However, a widely accepted and applied body of thought has been developed and utilized as principles of management. Because these principles are well-established, they are often referred to as classical management theory. This body of principles has developed primarily from the study of manufacturing organizations, where productivity is considered the measure of efficiency. It has also been applied to the study of public administration, as is discussed below. In recent years interdisciplinary interest in the study of management has revealed weaknesses of the classical principles through use of case study methods and attempts to verify the principles empirically. It is not yet evident, however, that any other systematic body of theory has been developed.

The classical principles emphasize the significance of formal structure of organizations as a means of achieving efficient operation. Human beings are viewed as rational, economically motivated, and requiring strict supervision. These assumptions are implicit in the statement of classical principles. Since 1945 social scientists have challenged this model of man with empirical evidence demonstrating that man is more unpredictable, more irrational, and more variously motivated than had been supposed under classical theory. The classical approach utilizes the formal structure of the organization to constrain through use of prescriptions and proscriptions the effects of human variability and, in doing so, tends to overlook the importance of informal organization, unauthorized communication patterns, and the effects of influences outside the organization.

Massie (2, pp. 396-402) summarized management concepts which are accepted as principles by current classical theorists:

1. Scalar principle. Authority and responsibility should flow in a clear unbroken line from the highest executive to the lowest operative. This principle may be called that of hierarchy or chain-of-command.

2. Unity of command. No member of an organization should receive orders from more than one superior. Application of this principle results in a simple line structure supplemented by staff advisors.

3. Exception principle. Top executives should deal only with extraordinary issues. Application of this principle results in delegation of authority for routine decisions.

4. Span of control. A superior can deal effectively with only a limited number of subordinates. The application of this principle encourages the development of intermediate levels within the hierarchy.

5. Organizational specialization. Work should be divided among units which specialize in their activities. Departmentalization by function results from the application of this principle.

6. Profit center concept. A large organization should be divided into integrated, self-contained units which are competitive and may be judged on their relative profit-ability. Decentralization results from application of this principle.

The Public Administration Model of Organization

The traditional view of organization in public administration has been summarized by Pfiffner and Sherwood (3, p. 65) as applied to state government organization. They name this set of principles "The Public Administration

Model." These views are advanced by many proponents of re-organization of state governments. They are generally derived from the previously listed principles of classical management theory and are subject to most of the same criticisms.

1. Executive leadership of administration. The governor should be the administrative leader as well as the political leader.
2. Unity of command. It is desirable to be able to place ultimate responsibility clearly on the governor.
3. Hierarchical conformation. Clearly defined and carefully observed channels of authority should lead from the lowest levels through intermediate levels to the governor. A pyramidal structure with the governor at the top results.
4. Span of control. The number of subordinates reporting to an administrator should be limited to the number to which he can give adequate attention.
5. Coordination through the budget. The governor's major device for program coordination is the budget.
6. Boards for advice but not for administration. Boards are viewed as inefficient for decision making.
7. Staff as instrumentality for coordination and control. Supervision of line units may be achieved efficiently through centralized administrative staffs for budgeting, accounting, and personnel.
8. Departmentation by general purpose. Agencies with related purposes should be grouped into departments.
9. Separation of politics and administration. Corruption in government can be reduced and efficiency increased if politicians are kept out of administrative posts.

Examination of these concepts reveals a much greater emphasis on developing executive leadership than on preserving the representative character. This indicates a growing importance attached to executive leadership and the consequent decline of legislators and other elected officials as representatives of the people. The mass media tend to focus on the governor, increasing his visibility to the public more than that of other state officials. As a result, the governor usually tends to be more sensitive to public opinion than legislators and other officials.

The objective of developing technical, non-partisan competence in the government service is dealt with in this model through the suggestions that both boards and politicians fulfill the traditional criteria of efficiency as administrators less successfully than single, non-political executives. The development of centralized administrative staffs and departmentation also further this objective.

It is appropriate to ask: What is the utility of classical organization theory in studying the organization of Georgia for water resources management? No workable theory has been developed which can adequately explain the processes of organization, or from which general hypotheses about the character of these processes can be deduced. What has resulted is a set of principles about organization which have been widely accepted and applied in guiding the design of organizations. As the practice of engineering developed historically, with experience and rules of thumb guiding designers in areas where science had not become operational, so the practice of organizational design has leaned heavily on a set of principles which can be made operational. The Public Administration Model described above is not a model in the sense of explaining the way an organization functions, but it is a model in the sense of formulating an ideal which can be used as a pattern in structuring real organizations. The importance of the model in this sense is demonstrated by the numerous recent executive branch reorganizations in American state governments. In each case examined, the new organization has complied with the model more closely than the organization which it replaced.

Of the six states examined in this study, three have moved toward compliance with the model in recent years. California, which most closely corresponds to the model, adopted its current structural form of eight agencies plus three departments in 1961 and 1963. Wisconsin reorganized its executive branch in 1967 and in so doing moved closer to the ideal of the model. Florida followed this procedure in 1969. Also during the years 1969 and 1970 the states of Delaware, Vermont, New York, New Jersey, Oregon, Massachusetts, and Wyoming undertook significant consolidation of existing agencies and other measures which moved their organizational patterns toward the ideal of the model. It appears from this evidence that criticism of the model for its theoretical content has not greatly affected its practical application. Whether the Public Administration Model describes only what is taking place or, as is probable, actually serves as a guide to reorganization, its correspondence with reality makes it worthy of further consideration.

The Research Model

A research model has been extracted from the Public Administration Model to permit the computation of a numerical index of deviation of natural resources organizational structures from the ideal of the model. The research model applies only to the structural characteristics at the top level of state government, the governor and the departments either reporting to him or independent of him. The model is not applied to the internal structure of the departments, as this would make each department, rather than each state, a separate case.

Use of the research model in comparing state natural resources organization is not meant at this point to imply anything regarding the validity of these principles as rules for organization. In fact, the validity for guiding water resources organization in Georgia is questioned in the analysis.

Components of the Research Model

The research model proposes measures of deviation for five of the nine principles of the Public Administration Model. These five principles are those most significant to the interdepartmental structure of state government. Measurements of deviation from the other principles would be more dependent on the internal structure of the various departments, which is not being investigated here. The components of the research model measure deviations in terms of 1) span of control, 2) executive leadership of the governor, 3) use of boards for advice, 4) departmentation by general purpose, and 5) separation of politics and administration. The five measures, based on the foregoing list of principles, are more specifically defined as follows:

Span of Control. The measure selected to represent deviation from the principle of limited span of control is the number of independent administrative agencies with full-time staff and active natural resources programs. The measure may assume positive integral values, with a value of 1 representing the minimum deviation from the principle; i.e. the inclusion of all natural resources programs in a single agency. The agencies counted need not be devoted wholly to natural resources activity. They need only include one or more active natural resources program in their range of activity.

Executive Leadership of the Governor. The measure of deviation from the principle of executive leadership is the proportion of the independent natural resources agencies not under the formal authority of the governor through his appointment either of the executive director or, for agencies administered by boards, of a majority of the administrative board of an agency. The proportion can assume values from 0.00 (for a state where the governor has complete authority) to 1.00 (for a state where he has no direct authority).

Boards for Advice. To measure deviation from the principle of using boards for advice but not for administration, the proportion of independent natural resource agencies directed by administrative boards is calculated. This proportion can vary from 0.00 (for a state where none of the agencies are administered by boards) to 1.00 (for a state where all the agencies are administered by boards). Advisory boards do not affect this measure.

Departmentation by General Purpose. To measure deviation from the principle of departmentation by general purpose, the proportion of narrow, single-purpose agencies among the independent natural resource agencies is calculated. For this calculation narrow, single purposes are considered to include: water quality control, water supply, water resources planning, forestry, fish and game, parks, soil conservation, and geology. In cases where natural resources programs are within departments of health, agriculture, conservation, natural resources, comprehensive water resources, or other broad purpose agencies they are considered as being within a general purpose department and therefore in compliance with the principle. The proportion may vary from 0.00 to 1.00.

Separation of Administration and Politics. The measure adopted for deviation from the principle of separation of administration and politics is the proportion of independent natural resource agencies headed by elected boards or by executives other than the governor. Election may be by the electorate directly or by representatives of either the electorate or of a special interest group. The proportion varies from 0.00 for compliance with the principle to 1.00 for complete deviation from it.

Index of Deviation from the Research Model

Application of the research model is made through computation of an index of deviation from the ideal structural form suggested by the five measures which compose the model. The index of deviation is a single number which represents the structural form of a state's natural resources organization. The index may be used to treat organizational structure as a continuous variable for analysis.

In computing an index of deviation it is not necessary to weight each of the five components equally. Four of the five components are expressed as proportions, each limited to a range of value from 0.00 to 1.00. The fifth component, span of control measured by the number of independent agencies, takes positive integers for values with no theoretical upper limit. In order to control the weighting effect of this measure, the common logarithm of the number of independent agencies is used in calculating the index of deviation. This component, the number of independent agencies, is considered the most significant structural factor in obtaining a comprehensive coordinated state resources program. The other four components, measured by proportions, are considered to be less significant factors. Each of the four is given equal weight in computing the index. The formula chosen for calculating the index of structural deviation from the ideal of the research model is the product of the average of the four proportions multiplied by the common logarithm of the number of independent agencies. The form of the calculation is summarized in Table 1.

Natural Resources Organization in Selected States

Descriptions of the formal aspects of natural resources organization in six states (Georgia, Florida, North Carolina, Kansas, Wisconsin, and California) which follow, have been organized so as to allow calculation of an index of structural deviation from the research model for each state. Only agencies which have full-time staffs are identified in all six states. For Georgia, several additional agencies without full-time staff are identified but are not considered when making comparisons with other states or in calculating the index of structural deviation. The following outline is utilized:

I. Agencies with full-time staff
    A. Under elected officials
        1. Under the governor
        2. Under other elected officials
    B. Headed by part-time boards

Table 1. Calculation of the Index of Deviation From the Research Model

Principle	Measured by	Range of Value
(1) Span of Control	Number of independent agencies	1 or more
(2) Executive Leadership of the Governor	Proportion of agencies not under formal authority of governor	0.00 to 1.00
(3) Boards for Advice	Proportions of agencies headed by administrative boards	0.00 to 1.00
(4) Departmentation by General Purpose	Proportion of agencies single-purpose in scope	0.00 to 1.00
(5) Separation of Administration and Politics	Proportion of agencies headed by elected officials	0.00 to 1.00
(6) Number of agencies	Log_{10} (1)	0.00 or more
(7) Average of four proportions	$\frac{(2) + (3) + (4) + (5)}{4}$	0.00 to 1.00
(8) Index of Structural Deviation	(6) x (7)	0.00 or more

        1. Majority of the board appointed by the governor
        2. Majority of the board ex-officio
        3. Majority of the board appointed by officials other than the governor
    - C. Headed by full-time boards
    - D. Inter-agency committees
- II. Agencies without full-time staff
    - A. Ex-officio bodies
    - B. Majority of board appointed by the governor
    - C. Inter-agency committees

Agencies are assigned positions in this classification according to statutory or constitutional authority for appointing the chief executive of the agency. Agencies dealing with natural resources, rather than more narrowly with water resources, have been considered because departments of natural resources in some states include most water resource programs, thus establishing a minimum unit appropriate for interstate comparisons of comprehensive water resources management.

Georgia

Georgia has the most unstructured form of state government organization of the six states examined. Only the classification of agencies with full-time staff is used to calculate the index of structural deviation. The agencies classified as without full-time staff are included to show the extent of the problem of inter-agency coordination in Georgia. Detailed references to the statutory authority on which this classification was based are included in Appendix A.

I. Agencies with full-time staffs

  A. Under elected officials

    1. Under the governor

      a. Department of Mines, Mining, and Geology

      b. Department of State Parks

      c. Bureau of State Planning and Community Affairs

  B. Headed by part-time boards

    1. Majority of the board appointed by the governor

      a. Game and Fish Commission (11)*

      b. Forestry Commission (5)

      c. Georgia Ports Authority (7)

      d. Water Quality Control Board (9)

      e. Department of Public Health (18)

      f. State Soil and Water Conservation Committee (5)

      g. Ocean Science Center of the Atlantic (15)

      h. Surface Mined Land Use Board (11)

    2. Majority of the board ex-officio

      a. Lake Lanier Islands Development Authority (9)

      b. Natural Areas Council (14)

    3. Majority of the board appointed by officials other than the governor

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*These numbers indicate the size of the body, if designated by law.

        a. Altamaha River Basin Commission (69)
        b. Groveland Lake Development Authority (20)

II. Agencies without full-time staff

  A. Ex-officio bodies

    1. Mineral Leasing Commission (4)
    2. Rivers and Harbors Development Commission (3)
    3. Division of Conservation
    4. Jekyll Island--State Park Authority (5)

  B. Majority of board appointed by the governor

    1. Engineering Advisory Board
    2. Waterways Commission (7)
    3. Commission for Development of the Chattahoochee River Basin (40)

  C. Interagency Committee

    1. Coastal Marshlands Protection Agency (7)

All of these agencies are independent of each other under the governor, except that four are attached to other agencies for administrative support only. These four are: (1) the Water Quality Control Board, which is attached to the Health Department; (2) the Surface Mined Land Use Board, which is attached to the Department of Mines, Mining, and Geology; (3) the Natural Areas Council, which is attached to the Parks Department; and (4) the Coastal Marshlands Protection Agency, which is attached to the Game and Fish Commission.

All of the agencies in the tabulation received separate appropriations in the budget act of 1969, as amended in 1970, except the following: the Natural Areas Council, the Rivers and Harbors Development Commission, the Coastal Marshlands Protection Agency, the Engineering Advisory Board, and the Waterways Commission.

Index of Deviation from the Research Model. Georgia has fifteen independent agencies with full-time staff and active natural resources programs. Of these fifteen, four are headed by boards of which the majority are ex-officio or appointed by officials other than the governor. Therefore, the proportion of agencies not under formal authority of the governor is 4/15 or 0.27.

Of the fifteen agencies, twelve are headed by administrative boards. Only the Departments of Mines, Mining, and Geology and of State Parks and the Bureau of State Planning and Community Affairs are headed by single executives. Thus the proportion of agencies headed by administrative boards is 12/15 or 0.80.

Of the fifteen agencies, all are classified as single-purpose in scope except the Health Department. The proportion of single-purpose agencies is 14/15 or 0.93.

None of the fifteen agencies are headed by elected officials other than the governor. This proportion is 0.00.

The average of the four proportions is 0.50. Multiplying the average by the common logarithm of 15 (1.18) yields the index of deviation for Georgia, 0.59.*

California

California is one of the states which has grouped its natural resources programs in a single agency (4). The Administrator of the Resources Agency is appointed by the governor and serves with the heads of seven other agencies in the cabinet. Department heads within the Resources Agency are also appointed by the governor. Boards concerned with natural resources do not make policy or otherwise participate in administration. They serve as advisory bodies and, in some cases, as appellate agencies.

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*These calculations are summarized for the six states in Table 2, p. 40.

I. Agencies with full-time staff
  A. Under elected officials
    1. Under the governor
      a. The Resources Agency
        1) Department of Water Resources
        2) Department of Conservation
        3) Department of Fish and Game
        4) Department of Harbors and Watercraft
        5) Water Resources Control Board
        6) Reclamation Board

Following changes effective July 1, 1968, the Department of Water Resources contained several administrative offices and the following divisions (5, pp. 28-32):

1) Design and Construction Division
2) Right-of-Way Acquisition Division
3) Resources Development Division
4) Safety of Dams Division

5) Power Office

6) Statewide Operations Office

7) Four district offices

Much of the activity of the Department of Water Resources concerns the development of the multi-billion dollar California State Water Project which is currently being constructed by the State. The activities of most of the Departments' divisions are suggested by their titles except, perhaps, the Resources Development Division, which conducts water resources planning, and the Statewide Operations Office, which operates numerous state-owned water projects.

The Department of Conservation conducts programs in the areas of soil conservation, forestry, mining and geology, and oil and gas. The Water Resources Control Board administers regulations concerning water rights and water quality control. The Reclamation Board manages and coordinates flood control programs on the Sacramento and San Joaquin Rivers.

Index of Deviation from the Research Model. In California natural resources programs are grouped within a single agency, the Resources Agency. The governor appoints the agency director so that the proportion not controlled by the governor is 0.00.

The director has the support of advisory boards, but he alone has administrative authority. The proportion of administrative boards is thus 0.00.

The Resources Agency has broad general purpose responsibilities. Therefore the proportion of single-purpose agencies is 0.00.

The Resources Agency director is appointed by the governor. The proportion of elected agency heads is 0.00.

The average of the four proportions is 0.00; the common logarithm of 1 is 0.00. Thus the index of deviation for California is 0.00.*

North Carolina

North Carolina has grouped many water resource programs in its Department of Water and Air Resources. Most other natural resources programs are in the Department of Conservation and Development. All the natural resource agencies listed are administered by part-time boards (6, 7).

I. Agencies with full-time staff
    A. Under elected officials
        1. Under the governor

            None
    B. Headed by part-time boards
        1. Majority of board appointed by the governor
            a. Department of Water and Air Resources (13)**
            b. Department of Conservation and Development (24)
            c. Wildlife Resources Commission (9)
            d. Board of Health (9)
            e. State Ports Authority (9)

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*These calculations are summarized for the six states in Table 2, p. 40.

**These numbers indicate the number of board members designated by law.

2. Majority of board ex-officio

    a. State Soil and Water Conservation Committee (7)

The Department of Water and Air Resources contains divisions of Navigable Waterways, Stream Sanitation and Hydrology, Ground Water, Water Resources Planning, and Air Pollution Control.

The Department of Conservation and Development contains divisions of Commerce and Industry, Commercial and Sports Fisheries, Community Planning, Forestry, Mineral Resources, Geodetic Survey, and State Parks.

The Wildlife Resources Commission manages and regulates inland (fresh water) fisheries and game programs. It is also responsible for boat registration and boating safety.

The Board of Health regulates public water supply, shellfish sanitation, disposal of radioactive wastes, mosquito control, formation of sanitary districts, and waste disposal systems not controlled by the Department of Water and Air Resources.

Index of Deviation from the Research Model. North Carolina has consolidated most of its water resources programs into a single agency. However, there remain six independent agencies with active natural resources programs. Of these six, only the Soil and Water Conservation Committee is not under formal authority of the governor. This proportion is 1/6 or 0.17.

All six agencies are headed by administrative boards rather than by single executives. Thus the proportion of agencies headed by administrative boards is 1.00.

Three agencies--the Wildlife Resources Commission, the Ports Authority, and the Soil and Water Conservation Committee--are classified as single-purpose. This proportion is 3/6 or 0.50.

None of the six agencies is headed by elected officials other than the governor. This proportion is 0.00.

The average of the four proportions is 0.42, and the logarithm of 6 is 0.78. Multiplying, the index of deviation for North Carolina is 0.33.*

Wisconsin

A comprehensive executive branch reorganization in Wisconsin in 1967 created a Department of Natural Resources in which most natural resources programs are now located (8, 9).

I. Agencies with full-time staff
    A. Under elected officials
        None
    B. Headed by part-time boards
        1. Majority appointed by governor
            a. Department of Natural Resources (7)**
            b. Board of Regents of the University of Wisconsin

The Department of Natural Resources include the following units:

A. Division of Resources Development

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*These calculations are summarized for the six states in Table 2, p. 40.

**Indicates number of members on board as designated by law.

1. Bureau of Water Resources
2. Bureau of Air Pollution Control
3. Bureau of Solid Wastes Disposal
4. Bureau of Recreation
5. Great Lakes Compact Commission
6. Natural Beauty Commission

B. Division of Conservation

1. Bureau of Forestry
2. Bureau of Fish and Game
3. Bureau of Parks
4. Scientific Areas Preservation Council
5. State Geographic Board
6. Conservation Youth Camps
7. Artificial Lake Creation

C. Recreation Council

D. Natural Resources Council of State Agencies

Natural resources agencies within the University of Wisconsin are the Soil Conservation Board, the Geological and Natural History Survey, and the Water Resources Center.

Index of Deviation from the Research Model. Since 1967 Wisconsin has had two independent agencies with natural resources programs, the Department of Natural Resources and the University of Wisconsin. As both are headed by boards appointed by the governor, the proportion not controlled by him is 0.00.

Both agencies are headed by administrative boards, making this proportion 1.00.

Neither agency is headed by elected officials. This proportion is 0.00.

The average of the four proportions is 0.25. The logarithm of 2 is 0.30. Multiplying, the index of deviation for Wisconsin is 0.08.*

Florida

Florida underwent extensive executive reorganization in 1969 under the Governmental Reorganization Act of 1969 (10). The Department of Natural Resources now contains most natural resource programs. Exceptions are pollution control, which is in the Department of Air and Water Pollution Control, and forestry and soil conservation, which are in the Department of Agriculture and Consumer Services. Because this reorganization is so recent, its effects cannot be compared very usefully to data from other states. For this reason the outline of organization which follows is based on conditions before the 1969 reorganization (11), and it will be used for computing the index of deviation from the research model.

I. Agencies with full-time staff
    A. Under elected officials
        1. Under elected Cabinet (7)**
            a. Board of Conservation
    B. Headed by part-time boards

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*These calculations are summarized for the six states in Table 2, p. 40.

**Indicates the membership designated by law.

1. Majority of board appointed by governor
    a. Board of Health (5)
    b. Game and Fresh Water Fish Commission (5)
    c. Board of Forestry (5)
    d. State Parks Board (5)

The Governor and six other elected officials (the Secretary of State, the Attorney General, the Commissioner of Agriculture, the Treasurer, the Comptroller, and the Superintendent of Public Instruction) formed the Cabinet, which served, ex-officio, as the Board of Conservation, the Soil and Water Conservation Board, and the Outdoor Recreation Development Council before 1969. From 1961 until 1969 the Board of Conservation had divisions of Administration, Salt Water Fisheries, Water Resources and Conservation, Waterways Development, Geology, and Shores and Beach Protection.

Index of Deviation from the Research Model. Based on the organization of Florida before 1969 as described above, the State had five independent natural resources agencies, with only the Board of Conservation not under the formal authority of the governor. The proportion not under the formal authority of the Governor was 1/5 or 0.20.

All five agencies were headed by administrative boards. This proportion was thus 1.00.

Three agencies--the Game and Fresh Water Fish Commission, the Board of Forestry, and the State Parks Board--were classified as single-purpose. The proportion of single-purpose agencies was 3/5 or 0.60.

The Board of Conservation was headed by the elected Cabinet. The proportion of agencies headed by elected officials was 1/5 or 0.20.

The average of these four proportions is 0.50. The logarithm of 5 is 0.70. Multiplying, the index of deviation for Florida before 1969 was 0.35.*

Kansas

In 1955, the Kansas legislature created the Kansas Water Resources Board to conduct water resources planning activities and to coordinate existing water resources programs in various state agencies. This action was in response to successive years of extreme damages by flood in 1951 and drought from 1952 to 1954. The success of the Water Resources Board in the difficult activity of coordinating programs among agencies over which it has minimal authority has been noteworthy (12, 13).

I. Agencies with full-time staff
  A. Under elected officials
    1. Under the governor
      None
    2. Elected by farm organizations
      a. Board of Agriculture (12)**
      b. Soil Conservation Committee (9)
  B. Headed by part-time boards
    1. Majority of board appointed by the governor

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*These calculations are summarized for the six states in Table 2, p. 40.

**Indicates the membership designated by law.

a. Forestry, Fish and Game Commission (5)

b. Board of Health (11)

c. Water Resources Board (7)

d. Park and Resources Authority (9)

e. Board of Regents of the University of Kansas (9)

C. Headed by full-time boards

1. Appointed by governor

a. State Corporation Commission (3)

The Board of Agriculture includes the Division of Water Resources, which administers water rights and supervises special districts for water control. The Kansas Geological Survey is part of the University of Kansas, and thus is under its Board of Regents. The State Corporation Commission supervises the control of brine wastes from oil wells. Water supply and pollution control programs are conducted by the Environmental Health Division of the Board of Health (14).

Index of Deviation from the Research Model. In Kansas, eight independent agencies were found to have active natural resources programs. Of the eight, all but two are under the formal authority of the governor. The proportion not under his formal authority is thus 2/8 or 0.25.

All eight agencies are headed by administrative boards. This proportion is 1.00.

Two agencies classified as single-purpose are the Soil Conservation Committee and the Water Resources Board. This proportion is 2/8 or 0.25.

The Board of Agriculture and the Soil Conservation Committee are elected by farm organizations. The proportion of agencies headed by elected officials is thus 2/8 or 0.25.

The average of the four proportions is 0.44, and the logarithm of eight is 0.90. Multiplying, the index of deviation for Kansas is 0.40.*

Summary

The research model has been used to analyze the formal organizational structure of natural resources management programs in Georgia and five other states. The results are summarized in Table 2.

These results show that the five principles of organization incorporated in the research model have not each been followed equally. The one most universally followed is that of the separation of administration and politics. This principle has been interpreted to mean that it is undesirable to elect heads of agencies. It is preferred that agency heads be appointed. Only three of the 37 agencies identified in the six states are headed by elected officials. Practice does not deviate significantly from this principle.

The principle of leadership of the governor has also generally been followed by these six states, but not as strictly as the separation of administration and politics. Only eight of the 37 agencies are not under the formal appointive authority of a governor.

There is no general agreement among these six states over the related principles of departmentation by general purpose and span of control. Georgia

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*These calculations are summarized for the six states in Table 2, p. 40.

Table 2. Deviation from the Research Model, Natural Resources Organization in Six States

Principle (Measured by)	Georgia	Florida	North Carolina	Kansas	Wisconsin	California	Average
(1) Span of Control (Number of independent agencies)	15	5	6	8	2	1	6.17
(2) Leadership of Governor (Proportion not under formal authority of Governor)	0.27	0.20	0.17	0.25	0.00	0.00	0.15
(3) Boards for Advice (Proportion headed by administrative boards)	0.80	1.00	1.00	1.00	1.00	0.00	0.81
(4) Departmentation by General Purpose (Proportion of single-purpose agencies)	0.93	0.60	0.50	0.25	0.00	0.00	0.38
(5) Separation of Administration and Politics (Proportion of agency heads elected)	0.00	0.20	0.00	0.25	0.00	0.00	0.08
(6) Log_{10} (1)	1.18	0.70	0.78	0.90	0.30	0.00	
(7) $\frac{(2) + (3) + (4) + (5)}{4}$	0.50	0.50	0.42	0.44	0.25	0.00	0.36
(8) Index of Deviation: (6) x (7)	0.59	0.35	0.33	0.40	0.08	0.00	0.30

ignores them, California and Wisconsin follow them, and the other three states follow them partially.

Only California has adopted the principle of using boards for advice, not for administration. In the other five states administrative boards head 33 of 36 agencies studied.

Calculation of the index of deviation from the research model shows that Georgia's natural resources organization deviates noticeably more than the other five states studied. A significant difference is indicated between California, which demonstrated no deviation, and Georgia. The deviation of the other states is scattered between the two extremes. Thus this index appears to be reasonably sensitive to variations in organizational structure.

CHAPTER III

WATER RESOURCES MANAGEMENT PROGRAMS IN GEORGIA

The structure of state water resources management organization demonstrates its primary practical significance through its effect on functional* programs of water and related land management. Therefore it is necessary to examine these functional programs in order to identify the effects of organizational structure. By posing a hypothetical comprehensive state water resources management program to which existing programs can be related, it is expected that certain effects of organizational structure on programs can be discovered. In this chapter the water resources management programs of Georgia will be described in this framework. In Chapter IV the effects of Georgia's organizational structure on these programs will be analyzed.

The functional water resources management categories to be considered are:

1. Water supply for domestic, municipal, and industrial uses
2. Water pollution control
3. Agricultural land and water use
4. Fish and wildlife

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*It is recognized that inherent semantic difficulties exist in describing the water resources management objectives of use, control, and planning. In this report the term function is used to meet this need, and the functional management categories define the classifications by which programs are ordered for study.

5. Recreation
6. Flood damage control
7. Navigation
8. Electric power generation
9. Comprehensive planning

The nine categories selected as the basis for classification of state programs are commonly used categories in the literature of water resources planning, although numerous variations in terminology and grouping occur (see, for example, references 15, 16, 17). The selection of this particular scheme was influenced by the organizational patterns observed in several states and the Federal government. One exception to common practice is the consideration of thermal and hydroelectric power generation together, rather than hydroelectric power alone. The changing technology of the electric power industry has led to increasingly large thermal generating units and to the increasing significance of resulting thermal wastes. Additionally, the effects of hydroelectric operations on water quality and on other reservoir and downstream uses are receiving growing attention. The increased recognition of the environmental effects of electric power generation, plus the special relation between the states and the electric power industry, as compared to private enterprises which are not regulated as public utilities, justify this modification in the view of the author.

Programs under each of the first eight functional categories have the objective of providing some good or service to the people of the state through the construction and operation of facilities or the control and regulation of the use of the physical environment. Under each of these functional categories it is necessary to consider programs of the following general types:

1. Data collection--the assembly of pertinent physical, economic, and social information useful in the planning and operation of functional management programs.
2. Functional planning--the analysis and projection of data describing present and expected supply and demand of resources and program services and the design of facilities and program services to meet anticipated needs in a functional management category.
3. Development--the construction of facilities and other preparations required to initiate operating programs.
4. Operation--the performance of the functional program, including operation and maintenance of facilities and the production of goods and services.

In these four types of programs, the state may conduct the activity itself, provide assistance to other agencies, or regulate the activity.

It is not to be implied that every state should provide a complete range of programs of each type in each category; however, it is expected that in most areas some state concern and activity is desirable.

The ninth category, comprehensive water resources planning, contains no programs of development or operation of facilities. It is instead concerned with the coordination, evaluation, and direction of the programs in the first eight categories. Planning programs may be expected to be among the least developed, because they require more established programs to relinquish some authority, while they also lack cohesive clientele groups to support them.

The complete classification of programs is presented in Table 3 along with the identification of Georgia and Federal government agencies which conduct active programs of each type in the state. Blank spaces in Table 3 indicate that no active program could be identified for that classification.

The classification of programs used in Table 3 is intended to be applicable to the analysis of any state, but it is here applied to the State of Georgia. In each program area, state agencies which have established operations are identified.

Table 3. State and Federal Water Resources Management Programs in Georgia

Programs	Agencies With Active Programs	
	State	Federal
I. Water Supply for Domestic, Municipal and Industrial Uses		
A. Data collection		
1. Quantity of surface water supply		Geological Survey
2. Quality of surface water supply	Health Dept. Water Quality Control Board	Geological Survey
3. Quantity of groundwater supply	Health Dept.	Geological Survey
4. Quality of groundwater supply	Health Dept.	Geological Survey
5. Quantity of municipal withdrawals	Health Dept.	
6. Quantity of industrial withdrawals		Census Bureau
7. Quantity of domestic withdrawals	Health Dept.	
8. Inventory of water supply facilities	Health Dept.	
9. Economics of water supply		
B. Water supply planning		
1. Regional assessment of supply and demand		
2. Technical assistance to local agencies		Soil Conservation Service
3. Financial assistance to local	Bureau of State Planning and Community Affairs	Housing and Urban Development
4. Regulates planning to protect public health	Health Dept.	
5. Regulates planning to protect public safety		
6. Regulates planning to protect water rights		
7. Enforces conformity to state water plan		
C. Development of water supply facilities		
1. Develops facilities		Soil Conservation Service
2. Financial assistance to local agencies		Farmers Home Admin. Housing & Urban Development
3. Regulates development to protect health	Health Dept.	
4. Regulates development to protect safety		
5. Regulates development to protect water rights		
D. Operation of water supply facilities		
1. Operates facilities		
2. Technical assistance to local agencies	Health Dept.	
3. Regulates operation to protect public health	Health Dept.	
4. Regulates operation to protect public safety		
5. Regulates operation to protect water rights		
II. Water Quality Control		
A. Data collection		
1. Surface water characteristics	Water Quality Control Board	Geological Survey Environmental Protection Agency Corps of Engineers Atomic Energy Com.
2. Ground water characteristics	Health Dept.	Geological Survey
3. Municipal discharge characteristics	Water Quality Control Board	Environmental Protection Agency
4. Industrial discharge characteristics	Water Quality Control Board	Environmental Protection Agency
5. Domestic discharge characteristics		
6. Inventory of treatment facilities	Water Quality Control Board	Environmental Protection Agency
7. Inventory of collection facilities	Water Quality Control Board	Environmental Protection Agency
8. Economics of water quality control	Water Quality Control Board	Environmental Protection Agency
B. Planning for water quality control		
1. Establish water quality standards	Water Quality Control Board	
2. Technical assistance to local agencies	Water Quality Control Board	
3. Financial assistance to local agencies		Housing & Urban Development Farmers Home Administration
4. Regulates planning to protect public health	Water Quality Control Board	
5. Regulates planning to protect public safety		
6. Regulates planning to protect water rights		
7. Regulates planning to protect environmental quality	Water Quality Control Board	
8. Enforces conformity to state water plan		
C. Development of water quality control facilities		
1. Develops facilities		
2. Financial assistance to local agencies		Environmental Protection Agency Farmers Home Administration
3. Regulates development to protect health	Water Quality Control Board	
4. Regulates development to protect safety		
5. Regulates development to protect water rights		
6. Regulates development to protect environmental quality		
D. Operation of water quality control facilities		
1. Operates facilities		
2. Technical assistance to local agencies	Water Quality Control Board	
3. Regulates operation to protect public health	Water Quality Control Board	
4. Regulates operation to protect public safety		
5. Regulates operation to protect water rights		
6. Regulates operation to protect environmental quality	Water Quality Control Board	

Table 3 (Continued)

Programs	Agencies With Active Programs	
	State	Federal
III. Agricultural Land and Water Use		
A. Data collection		
1. Land capability inventory		Soil Conservation Service
2. Land use inventory	Forestry Com.	Agricultural Stabilization & Conservation Service
3. Surface water supplies		
4. Ground water supplies		
5. Water use for irrigation		Census Bureau
6. Water use for stock watering		
7. Water use for domestic purposes		
8. Erosion problems	Soil & Water Conservation Com.	Soil Conservation Service
9. Salinity problems		
10. Drainage problems		Soil Conservation Service
B. Planning for agricultural land and water use		
1. Technical assistance to local agencies	Forestry Com.	Soil Conservation Service
2. Financial assistance to local agencies	Soil & Water Conservation Com.	Soil Conservation Service
3. Regulates planning to protect health	Health Dept.	
4. Regulates planning to protect safety		
5. Regulates planning to protect water rights		
6. Regulates planning to protect environment		
7. Enforces conformity to state water plan		
C. Development for agriculture		
1. Develops facilities		Soil Conservation Service
2. Financial assistance to local agencies	Soil & Water Conservation Com.	Soil Conservation Service
3. Regulates development to protect health	Health Dept.	
4. Regulates development to protect safety		
5. Regulates development to protect water rights		
6. Regulates development to protect environmental quality		
D. Operation of facilities for agriculture		
1. Operates facilities		
2. Financial assistance to local agencies	Soil & Water Conservation Com.	Soil Conservation Service
3. Technical assistance to local agencies		
4. Regulates operation to protect health	Health Dept.	
5. Regulates operation to protect safety		
6. Regulates operation to protect water rights		
7. Regulates operation to protect environmental quality		
8. Provides fire protection	Forestry Com.	
IV. Fish and Wildlife		
A. Data collection		
1. Commercial fisheries	Game & Fish Com.	Fish & Wildlife Service
2. Game fisheries	Game & Fish Com.	Fish & Wildlife Service
3. Wildlife	Game & Fish Com.	Fish & Wildlife Service
B. Planning for fish and wildlife		
1. Plan commercial fishery programs	Game & Fish Com.	
2. Plan game fishery programs	Game & Fish Com.	
3. Plan wildlife programs	Game & Fish Com.	Soil Conservation Service
4. Technical assistance to other agencies	Game & Fish Com.	
5. Regulates planning to protect fish and wildlife programs		
C. Development of fish and wildlife programs		
1. Constructs facilities	Game & Fish Com.	
2. Technical assistance to other agencies		
3. Regulates water resource development to protect fish and wildlife		
D. Operation of fish and wildlife programs		
1. Operates game fishing facilities	Game & Fish Com.	Corps of Engineers
2. Operates wildlife management facilities	Game & Fish Com.	
3. Regulates game fishing	Game & Fish Com.	
4. Regulates hunting	Game & Fish Com.	
5. Regulates commercial fishing	Game & Fish Com.	
V. Outdoor Recreation		
A. Data collection		
1. Inventory of facilities	Parks Dept. Bureau of State Planning & Community Affairs	Bureau of Outdoor Recreation
2. Use of facilities	Parks Dept. Bureau of State Planning & Community Affairs	Bureau of Outdoor Recreation
B. Planning outdoor recreation		
1. Plans facilities	Parks Dept. Lake Lanier Islands Development Auth. Groveland Lake Development Auth.	
2. Technical assistance to local agencies		
3. Financial assistance to local agencies		
C. Development of outdoor recreation		
1. Develops facilities	Parks Dept. Jekyll Island--State Park Auth. Lake Lanier Islands Development Auth.	Forest Service Corps of Engineers National Park Service
2. Financial assistance to local agencies		
3. Regulates development		

Table 3 (Continued)

Programs	Agencies With Active Programs	
	State	Federal
D. Operation of outdoor recreation facilities		
1. Operates facilities	Parks Dept. Jekyll Island Auth. Stone Mountain Memorial Assoc.	Forest Service Corps of Engineers National Park Service Bureau of Outdoor Recreation
2. Technical assistance to local agencies		
3. Regulates operation		
VI. Flood Management		
A. Data collection		
1. Hydrologic data	Highway Dept.	Corps of Engineers Geological Survey Weather Bureau Soil Conservation Service
2. Flood damages		Corps of Engineers Soil Conservation Service
3. Legal institutions for flood management		
4. Inventory of flood management facilities		
B. Planning flood management programs		
1. Physical flood control measures		Corps of Engineers Soil Conservation Service
2. Non-structural flood control measures		
3. Regulates flood management planning		
4. Financial assistance to local agencies		
C. Development of flood management programs		
1. Construction of control works		Corps of Engineers Soil Conservation Service
2. Financial assistance to local agencies	Soil & Water Conservation Com.	Soil Conservation Service
3. Regulates flood management programs		
4. Defines physical limits for non-structural flood management program		
D. Operation of flood management programs		
1. Operation and maintenance of control works		Corps of Engineers
2. Technical assistance to local agencies		
3. Financial assistance to local agencies		
4. Regulates land use for flood management purposes		
5. Regulates operation of flood control works for safety		
VII. Navigation		
A. Data collection		
1. Inventory of facilities	Bureau of State Planning & Community Affairs	
2. Use of facilities	Bureau of State Planning & Community Affairs	Corps of Engineers
B. Planning for navigation		
1. Evaluation of needs for navigation facilities	Bureau of State Planning & Community Affairs	Corps of Engineers
2. Facility planning	Ports Auth.	Corps of Engineers
3. Regulates planning of navigation facilities to protect public interest		
C. Development of navigation facilities		
1. Construction of facilities	Ports Auth.	Corps of Engineers
2. Financial assistance		
3. Regulates navigation facility development to protect public interest.		
D. Operation of navigation facilities		
1. Operates facilities	Ports Auth.	Corps of Engineers
2. Financial assistance		
3. Regulates operation of navigation facilities to protect public interest		
VIII. Electrical Power Generation		
A. Data collection		
1. Inventory of facilities		
2. Power demand		
3. Effects on water quantity		
4. Effects on water quality	Water Quality Control Board	
B. Planning for electric power		
1. Plans facilities		Corps of Engineers Federal Power Com.
2. Regulates planning of power facilities to protect public interest	Water Quality Control Board	
C. Development of electric power facilities		
1. Constructs facilities		Corps of Engineers Federal Power Com.
2. Regulates construction of power facilities to protect public interest	Water Quality Control Board	
D. Operation of electric power facilities		
1. Operates facilities		Corps of Engineers Federal Power Com.
2. Regulates operation of electric power generation facilities to protect public interest	Water Quality Control Board	

Table 3 (Concluded)

Programs	Agencies With Active Programs	
	State	Federal
IX. Comprehensive Water Resources Planning		
A. Data collection		
1. Centralized water resources data collection program		
2. Inventory of water resource developments		Corps of Engineers Resources Advisory Bd.
B. Planning		
1. Evaluation of needs for state water resources legislation		
2. Development of a state water plan		
C. Coordination of programs		
1. Establish procedures for coordination of state water resources programs		
2. Establish procedures for coordination of state with Federal water resource programs		
3. Establish procedures for coordination of state with local water resource programs		

CHAPTER IV

EFFECTS OF ORGANIZATIONAL STRUCTURE ON WATER RESOURCES MANAGEMENT PROGRAMS

Having demonstrated that Georgia's use of numerous limited-purpose agencies is strikingly different from the organizational structures of five states which are presumed to have superior water resource management programs, this organizational pattern will be examined through the development and testing of hypotheses formulated to explain its detailed effects. It is expected that organizational arrangements alternative to the widespread reorganization suggested by the public administration model can be developed. Some of these alternatives are more likely to be adopted than the ideal reorganization.

Organizational systems may adopt formal structures to help accomplish goals of four types--to make the organization more manageable, more adaptable, more efficient, and more adequate in its capacity to perform the functions of the organization. Formal structure may contribute to other goals, and organizations may use other devices to pursue these goals. Particularly in public administration, however, formal structure is viewed as a means of moving toward these desired objectives. The principles of the public administration model are more or less explicit proposals on how these goals can be approached. But, as has been suggested, other alternatives exist. Behaviorists stress the importance of informal structure and communication in the operation of organizations. The organization of water resource programs in the other states studied also suggests alternatives to the ideals of the model.

The Requirement of Manageability

An organization is manageable when it is responsive to direction by legitimate authority. An obviously desirable characteristic of any organizational structure is that it contribute to the manageability of the organization. Ideal structures of state government have emphasized enhancing the role of the governor in administration as a means of achieving manageability as well as other goals. One reason for doing this is the view that the governor is the most responsive to the people and therefore the most legitimate of the alternative authorities which might direct state government. Because the governor is elected, he is assumed to be more representative of all the people than other officials are likely to be, and the continued attention of the press and the public are frequently cited as means which keep him more alert to public opinion. Unlike the national executive, however, governors often share legitimate authority with other separately elected department heads, legislators, employees of the state, and Federal officials.

Unofficial authority also may become legitimate through custom or statute. Typically this results from the notion that groups affected by the state's programs are best qualified to oversee the operation of the programs. Farmers' organizations in many states name members of state soil conservation committees. The administrative boards of regulatory agencies are often composed of representatives of the regulated interests. In such cases unofficial authority has been made legitimate and semi-official. More informal advice and consultation between state agencies and their clientele may result in informal acceptance of a legitimate policy-making role for the clientele groups, but such practices increase the danger of illegitimate participation as the process becomes more remote from public view.

A major value of formal organizational structure and formal procedures is in exposing the decision making process to more observers and potential participants. The governor, for example, would find it easier to participate in the administration of programs in more areas of government where the degree of formal structure is greater than it is in Georgia.

From these observations it is hypothesized that management decisions in a state government which lacks formal structuring of its organization will come from many independent sources and will be poorly coordinated. This frequently leads to conflicting goals and programs, minimal adjustment of agency budget requests by the governor and the legislature, and strikingly uneven levels of activity among agencies.

Inter-agency Conflict

Potential for inter-agency conflict in Georgia is indicated in Table 3 by the listing of two or more agencies working in the same area. Inspection of the table reveals seven cases where two or more state agencies are active in the same program areas. Four of these cases are in areas of data collection. Such instances of apparent overlap in programs are more complementary than conflicting in the Georgia situation. However, increasing political importance of water in Georgia could lead to conflict in the future. Three additional cases are the planning, development, and operation of outdoor recreation facilities, which involve the State Parks

Department, the Lake Lanier Islands Development Authority, the Groveland Lake Development Authority, the Jekyll Island Authority, the Stone Mountain Memorial Association, and the Jekyll Island--State Park Authority.

The Lake Lanier Islands and Groveland Lake Authorities have been formed to develop recreational facilities at those two specific locations and are limited to those programs. The Jekyll Island--State Park Authority finances capital development at state parks outside the State's constitutional debt limit. The Authority was formed by merging two existing authorities; hence its current name. The Jekyll Island and the Stone Mountain agencies operate facilities at these locations. Only the State Parks Department carries on a state-wide range of programs in outdoor recreation. It secures capital through the Jekyll Island--State Park Authority, a public authority whose ex-officio membership includes the Director of the State Parks Department.

With several agencies operating similar programs, some confusion and duplication are likely, and priorities for State funds may become distorted. But conflicts would be expected to be limited by the narrow responsibilities of most of these agencies to operate separate facilities. It appears that the legislature has been reluctant to allow the operation of large revenue-producing facilities to come under an agency headed by an appointed director rather than an administrative board. Potential conflicts between the agencies involved in outdoor recreation appear to be limited and have not been notable.

The final area of potential conflict identified in this manner is the evaluation of needs for navigation facilities, an area in which the Bureau of State

Planning and Community Affairs and the State Ports Authority are active. Conflict here could result if the Bureau's State transportation plan conflicts with the plans of the Ports Authority. The Commission for the Development of the Chattahoochee Basin has also investigated the need for navigation on the Chattahoochee to Atlanta so that three conflicting state plans for that river are possible.

The number of potential conflicts among state natural resource agencies through duplication of programs is smaller than would be expected from the large number of agencies involved. This can be explained largely by the narrow definition of purposes of most agencies and the numerous resulting gaps in program coverage.

A more serious potential for conflict exists in State-Federal relations, because dual programs of a single type are much more often State-Federal or Federal-Federal than State-State. This demonstrates both the extensive involvement of Federal agencies in natural resource programs and the decentralized organization within the Federal government. The Federal pattern of organization probably encourages the maintenance of the State's similarly decentralized pattern of organization.

The Budget as a Device for Coordination

The budgetary processes used by Georgia and Wisconsin have been investigated by Sharkansky and Turnbull (18), who proposed a model in which agencies initiate budget requests and the governor reviews and adjusts the requests before recommending them to the legislature. Reviewers (governor and legislature) examine only the increments added to previous budget amounts. They cut only the incremental requests. They do not cut unless an increment is requested, and they do not impose unrequested increments. Furthermore, in the model the legislature accepts the budget forwarded by the governor with little or no adjustment. After studying Georgia under two governors with very different styles, the investigators concluded that their model fitted Georgia very well during the 1960's. They explained Wisconsin's deviations from the model as resulting from the personalities of the governors during the period studied. Should Georgia indeed conform to this model, then it could be concluded that Governors of Georgia have not used their authority fully to coordinate agency programs through this convenient device. In Georgia, therefore, the independent agencies appear stronger in determining budgetary policy than the governor, whereas he is stronger than the legislature. In a state with greater formal structure of organization in natural resources, such as Wisconsin, governors have been more active in the budgeting process. Although they are not conclusive, these results tend to support the previously stated hypothesis that management decisions in decentralized organizations will be poorly coordinated. They also would support the extension of the hypothesis to say that in a more centralized organization the governor can more easily use the budget as an instrument for coordination.

One would expect the amount of money spent by an agency to serve as an indicator of its degree of activity. Therefore, in order to investigate the previously stated hypothesis that Georgia's agencies would have strikingly uneven levels of activity, data on State appropriations are presented in Table 4. In order that trends also can be considered, data for three recent fiscal years are given. Many of the

Table 4. Distribution of Appropriations Among Agencies

Concerned with Natural Resources

		Proportions of Annual Totals***		
		Fiscal Year		
Agency	Number of* Employees June 30, 1968	1971	1968	1965
1. Bureau of State Planning and Community Affairs	45	.071	.089	-
2. Ports Authority	**	.091	.095	.148
3. Forestry Commission	837	.308	.289	.294
4. Game and Fish Commission	292	.187	.191	.221
5. Jekyll Island Commission	**	.018	.027	.063
6. Mines, Mining, and Geology	14	.035	.033	.033
a. Regular Operations		.029	.019	.033
b. South Georgia Mineral Exploration	Outside contract	-	.014	-
c. Surface Mined Land Use Board	Established 1970	.006	-	-
7. Ocean Science Center of the Atlantic	10	.028	.021	-
8. State Parks	109	.210	.215	.210
a. General		.100	.081	.166
b. Jekyll Island--State Park Authority	**	.052	.064	-
c. Stone Mountain	**	.045	.066	.045
d. Lake Lanier Is. Auth.	**	.012	.003	-
9. Soil and Water Conservation Committee	4	.021	.025	.030
10. Water Quality Control Board	37	.024	.014	-

Table 4 (Continued). Distribution of Appropriations Among Agencies Concerned with Natural Resources

	Number of[*] Employees June 30. 1968	Proportions of Annual Totals[***]		
		Fiscal Year		
		1971	1968	1965
11. Groveland Lake Development Commission	Established 1970	.006	-	-
12. Altamaha River Basin Commission	Established 1970	.001	-	-

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[*] Davis, E. B., *Report of the State Auditor of Georgia, Year Ended June 30, 1968*, Atlanta, December 31, 1968.

[**] Information on file in the Office of the State Auditor.

[***] The total state appropriations to Georgia natural resources agencies were as follows (in $1,000's): 1971, $22,018; 1968, $15,834; and 1965, $7,812.

agencies listed receive additional funds from other sources and this will be considered in the following discussion.

The Forestry Commission is by far the largest agency, receiving about 30 per cent of the total appropriation for natural resources agencies in each of the three years. The Commission's appropriation tripled from 1965 to 1971. The forest and rural area fire control program, which has covered the entire State since 1967, accounts for most of the Commission's expenditure. Because rural area (non-forest) fire protection is not a natural resources program, it is not implied that all these funds go to natural resources programs. However, this additional large program does swell the agency's budget and contributes the advantages of size. With additional funds from the Federal government and from county governments amounting to over $2 million in 1968, this agency's total budget is even greater in relation to the other agencies than appears from the table.

The Game and Fish Commission has slipped from 22 per cent of the total in 1965 to 19 per cent in 1971. This agency also receives substantial Federal grants. The Commission's major expenditure is on the enforcement of game and fish laws, through the employment of uniformed game and fish wardens.

The group of agencies listed under state parks in the budget has accounted for 21 per cent of the natural resources agency appropriation in each of the three years. However, the share administered directly by the State Parks Department has declined from 17 per cent in 1965 to 10 per cent in 1971. Capital improvements expenditures are now largely administered by independent authorities, which use the administrative services of the Department. The Parks Department has received substantial Federal grants.

The State Ports Authority receives about 9 per cent of the natural resources agency appropriation, an amount used to retire capital improvement bonds.

The Bureau of State Planning and Community Affairs' share dropped from 9 per cent in 1968 to 7 per cent in 1971. The Bureau receives Federal grants, and many of its programs are the consequence of Federal requirements.

Three agencies particularly significant to water resources management, which received 2 to 3 per cent each of the natural resources agency appropriation in 1971, are the Department of Mines, Mining, and Geology; the State Soil and

Water Conservation Committee; and the Water Quality Control Board. The first two agencies expend more than half of their appropriations on outside contracts with Federal agencies and others. The Water Quality Control Board, however, received Federal funds which approximately match the state appropriation.

In order to assess the weights which the State has placed on various natural resource programs, some comparisons based on the economic values of the resources are presented. The economic value of water is based largely on its use as water supply for various purposes. The Water Quality Control Board and the Department of Mines, Mining, and Geology operate the State programs which protect the quality and describe the quantity of the water resource. Combined, their water resource programs received less than 4 per cent of the total 1971 natural resources agency appropriation, whereas the Forestry Commission received about 30 per cent of the natural resources agency appropriation; however, the rural fire protection program is included although it is not a natural resources program. The Forest Research Council, which received a separate appropriation not included in any of the totals, has always received more than the Water Quality Control Board. The program of the State Ports Authority concerns the economic value of water for navigation. The Authority's 9 per cent share of the total appropriation ranks navigation well ahead of water supply. Thus the State could be said to weight its forestry programs much more heavily, and navigation twice as heavily as its programs related to water supply. In a state whose industrial expansion in textiles, pulp, paper, and chemicals has been greatly enhanced by the availability of good water supply, this relative neglect of programs related to water supply is evidence that priorities have been more heavily influenced by short run economic interests of existing industry than by longer run economic and social needs for water supply.

To move toward an explanation of this interagency variability, it is further suggested that, in an organizational structure of small, independent agencies, the agency clientele groups will be relatively more influential, and official authority will tend to be more ineffectual.

Interest groups with strong political influence usually receive more benefits from state programs than less influential groups. Traditionally influential rural landowners enjoy the benefits of the largest single program, that of the Forestry Commission, as well as the program which is directed by the State Soil and Water Conservation Committee. The counties are also politically strong, and they have benefitted from and supported the Forestry Commission's fire control programs. The Commission reports some 80 per cent of its expenditure under the category of "Counties"(19).

There has been a relative decline in the share of state funds going to the Game and Fish Commission in recent years. The Commission has suffered from recent political struggles and changes of Director, and these changes may have eroded its political power.

Municipal governments are most directly affected by the Bureau of State Planning and Community Affairs and the Water Quality Control Board. The Bureau, whose programs aid cities more than counties or rural areas, has seen its share of the appropriation decline between 1968 and 1971. The Board, whose current programs are regulatory in relation to cities, has grown at a modest rate, while its proposed program of construction grants to cities has failed to secure any state funds. Municipal government proponents have been ineffective in influencing the State's natural resources appropriation.

Urban residents might be expected to support the State Parks Department and, probably, the Water Quality Control Board. Parks has held its own, with a substantial share of the total appropriation (about 21 per cent), and the Water Quality Control Board has grown moderately. Urban residents have thus more reason to be satisfied with the natural resources budget than have municipal governments.

Industrial interests have traditionally been among the most powerful influences on state government in Georgia and elsewhere. That state water quality control programs generally remained ineffective until Federal legislation required the states to act, was due in part to the opposition of industry to regulation of waste discharges. Now industry is well represented on the Georgia Water Quality Control Board. The Board's programs have been expanding rather modestly. Less modest has been the growth of the Forestry Commission and of the Forest Research Council, both of which benefit the important pulp and paper industry. So it appears that existing Georgia industry tends to receive more favorable treatment through the natural resources budget of the State than do some other interests.

The Requirement of Adaptability

Modern state governments need to be adaptable in order to meet continually changing requirements. Georgia's organizational structure could be expected to retard adaptability because natural resources programs are operated by agencies with relatively narrow statutory responsibility. Program adaptation is complicated by the necessity of obtaining additional statutory authority. Often new agencies have been created. Examples include the Surface Mined Land Use Board, the Natural Areas Council, the Coastal Marshlands Protection Agency, and the commissions for the Chattahoochee and Altamaha Basins. Agencies with broader, more general purposes would have more internal flexibility and should be more adaptable and able to make program adjustments without so often requiring legislation.

Adoption of Innovations

A measure related to adaptability has been developed by Walker (20) and applied to the adoption of selected governmental innovations by the states. The Walker scores for each state were calculated based on how early the state legislature adopted 88 programs which have received wide acceptance over a period extending from the 19th century until 1965. The innovations include some in health, conservation, planning, administrative organization, regulation of professions and other areas. A correlation of these Walker scores on innovation with the index of deviation from the public administration model derived earlier could suggest the degree of relation between organizational structure and adaptability. The comparison is far from perfect, however. The Walker score represents the entire range of state government activity and covers a long time period. The deviation index is based on natural resources organization during recent years. Thus the correspondence depends on whether historic adaptability can represent present potential and whether organizational patterns in natural resources are repeated throughout state government organization. The acceptance of both conditions, though precision is lost, seems reasonable in order to gain the use of the results of an unusually broad measure for comparing the states.

Table 5. Comparison of Deviation Index and Walker Score for Six States

State	Natural Resources Administration Deviation Index	Walker Score	Walker Score Rank among 48 States
Georgia	0.59	.381	37
Florida	0.35	.397	31
North Carolina	0.33	.430	24
Kansas	0.40	.426	25
Wisconsin	0.08	.532	10
California	0.00	.604	3

The correlation between the administration deviation index and the Walker innovation score for the six states shown in Figure 1 is unexpectedly high. This is interpreted as indicating that adaptability as measured by Walker's score is related to organizational structure. States which follow classical organizational principles more closely have also adopted significant innovations in state government more quickly. This supports the association between Georgia's form of governmental structure and consequent low adaptability, which had been proposed earlier.

Program Planning

One hypothetical effect of small agency size is the neglect of staff functions,

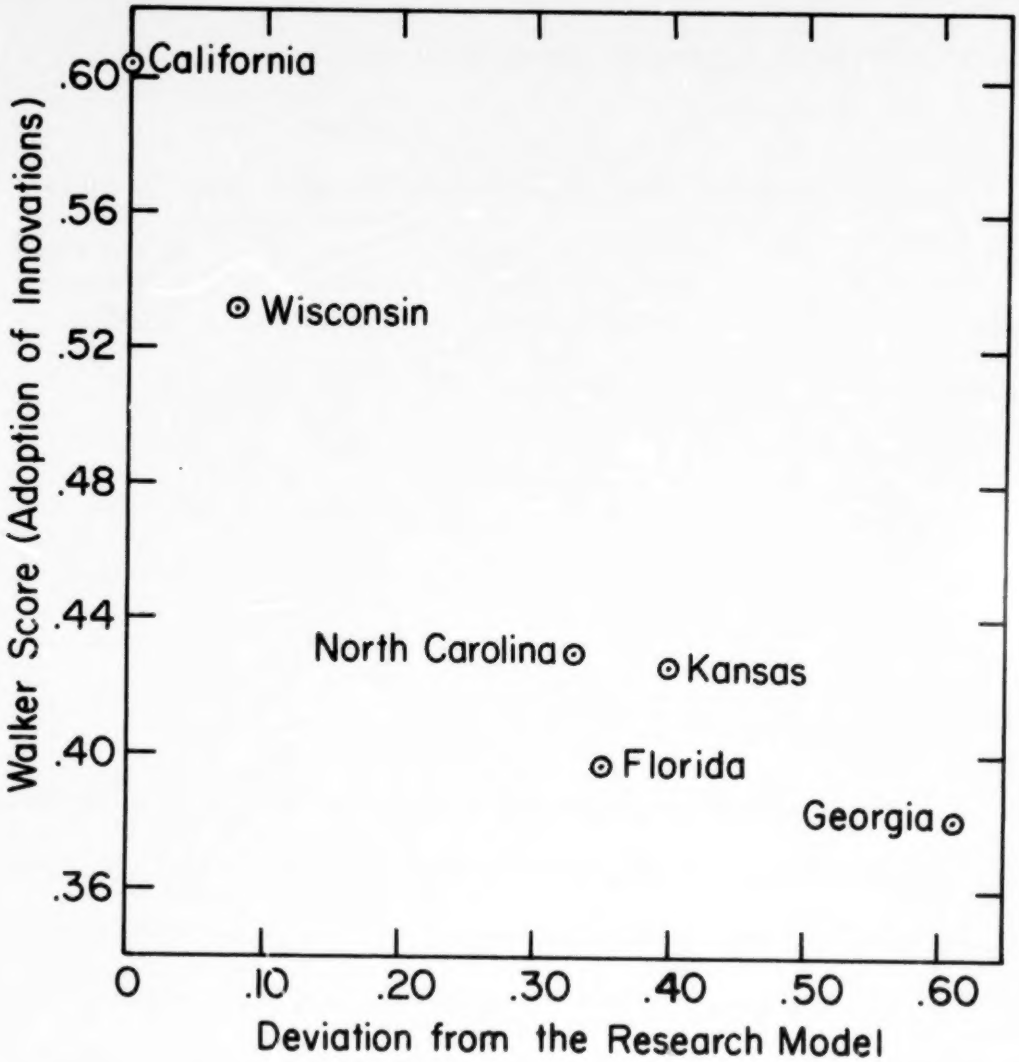

Figure I. Correlation of Measures of Organizational Structure and Adoption of Innovation.

particularly in program planning and evaluation. This tendency is supported by the effect of minimal attention given to each agency by the central authority, specifically the governor's office. Some evidence to support this hypothesis is contained in the reports of the Governor's Commission on Economy and Efficiency and their management consultants (21, 22). Of the two natural resources agencies which were studied, the Game and Fish Commission and the Department of Mines, Mining, and Geology, both were found to have poor program planning. Consequently, the Game and Fish Commission adopted an internal reorganization plan which included the establishment of a staff office for program planning and evaluation. It should be noted that the Game and Fish Commission is a relatively large agency and should be expected to have some internal flexibility as a result.

The Department of Mines, Mining, and Geology was found to be seriously lacking in program planning and objectives. A small agency, headed by a Director near retirement, this agency was slow to adjust in response to the criticisms of the Commission.

Shortcomings in providing adequate staff program planning and evaluation services are thus expected to remain a chronic problem of small agencies.

The Requirement of Adequacy

The most important requirement of any organization is that it be adequate to carry out its function. Organizational structure can affect the adequacy of an organization through the range of program areas covered, the quality of the programs, and staff planning and evaluation.

Range of Program Area Coverage

The range of program areas covered by active programs in an organization with units of relatively small size is expected to omit programs which are desirable from the viewpoint of the state's interest. This is caused primarily by the lack of flexibility and inadequate staff for program planning and evaluation already identified.

The range of program coverage in Georgia water resources management as of 1970 has been described in Chapter III and Table 3. This information is summarized by functional areas and program categories in Table 6. The most striking evidence is the complete lack of state programs for comprehensive water resources planning. Federal agencies are also weak in this functional area. The most complete coverage is in the area of fish and wildlife, where 81 per cent of the suggested program areas are covered by existing state programs. However, this is the only functional area in which much more than half the programs are covered.

When Federal programs are added, the areas of flood management and agriculture still remain below 50 per cent coverage, along with comprehensive planning. The low coverage for agriculture was unexpected, because of the very active programs of the State Soil and Water Conservation Committee and the Federal Soil Conservation Service. The low coverage results from the lack of regulatory programs to protect safety, water rights, and environmental quality in the planning, development, and operation of agricultural water resources facilities. This lack of regulatory programs is noticeable also in other areas.

Of the four categories of program activity listed, the State is least active

Table 6. Percentage of Suggested Water Resources Programs Active in Georgia, 1970

Functional Area	(Suggested Number of Programs)	Percentage of Active Programs	
		State Only	Either State or Federal
I. Water Supply	(25)	44%	64%
II. Pollution Control	(28)	50	57
III. Agriculture	(32)	31	47
IV. Fish and Wildlife	(16)	81	81
V. Recreation	(11)	45	64
VI. Flood Management	(17)	12	35
VII. Navigation	(11)	55	55
VIII. Electric Power	(10)	40	70
IX. Water Planning	(7)	0	14
Program Category			
A. Data Collection	(44)	57	70
B. Plan Facilities	(41)	39	51
C. Develop Facilities	(35)	26	43
D. Operate Facilities	(37)	43	54

in the development of facilities and most active in data collection. Federal programs add modest additional coverage in each category. However, Federal programs add less coverage than was expected. This reflects the intended bias of the classification scheme to identify state program needs.

The State's omission of regulatory programs for protection of safety and water rights contributes heavily to lowering the coverage percentages. There is a growing need for the State to provide a dam and reservoir safety program, because private and non-Federal dam construction appears to be increasing. There is also a growing need for water rights adjudication and regulation as irrigation becomes more widespread in Georgia and other more established uses continue to grow.

The coverage by state programs appears unsatisfactorily low, because in only 4 of 13 functional areas does it reach as much as 50 per cent. The additional coverage by Federal programs increases the total coverage to more than 60 per cent in only 5 areas. An association between the amount of program coverage and organizational structure is implied by these observations, but it cannot be convincingly demonstrated without data for comparison with other states.

Program Quality

Direct measures of program quality have not been developed. However, an indirect measure of quality potential is suggested by the average wages of state employees. It would be expected that small agency size leads to low average wages because there are few supervisory levels with high pay scales. This leads also to a high turnover rate when personnel move out of state government for higher pay.

Data are available on the average weekly wages of state government employees for 1969 (23). These data are presented in Table 7 and correlated with the administration deviation index in Figure 2. The correlation in Figure 2 suggests a very strong association between organizational structure and average wages in state government. The significance of this association is enhanced by evidence that it is stronger than the association between organizational structure and state per capita income (24). The following linear correlation coefficients, calculated from data for the six states studied, demonstrate these relationships: 1) correlation of deviation index with average wages of state employees, -0.91; 2) correlation of deviation index with state per capita income, -0.77; and 3) correlation of average wages of state employees with state per capita income, 0.87.

The high correlation between wages of state employees and per capita income was expected. However, the even higher correlation between organizational structure and wages of state employees was unexpected and is not explained by the association of organizational structure and per capita income. Thus, the hypothesis is supported that high deviation of organizational structure from the research model results in low wages for state employees. If wages can indicate program quality, then an effect of organizational structure on program quality which appears to support traditional organization theory has been demonstrated.

Summary of Findings

The results of this study are not conclusive concerning the effects of organizational structure on the effectiveness of state water resources management

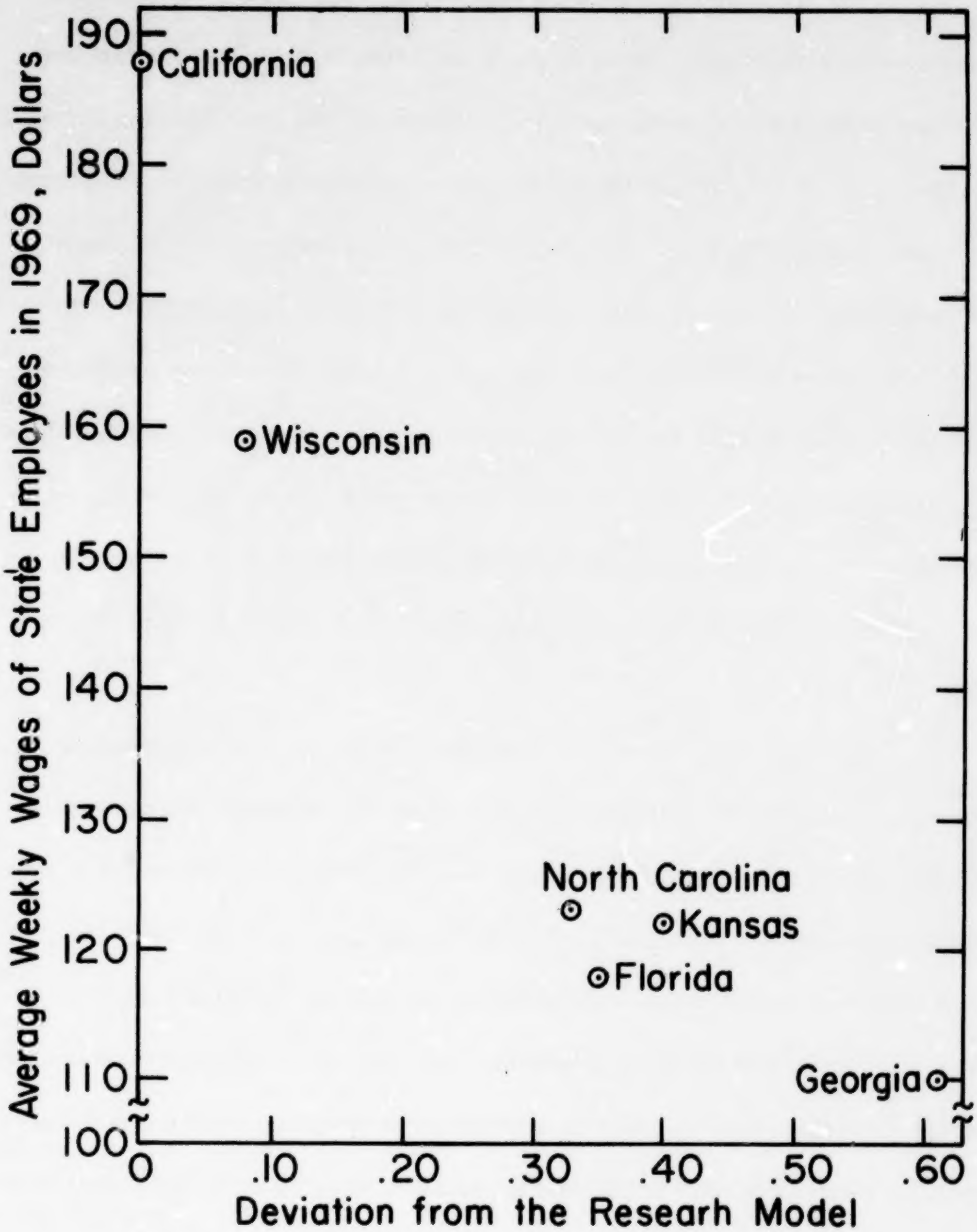

Figure 2. Correlation of Average Wages and a Measure of Organizational Structure.

Table 7. Weekly Wages of State Employees in 1969

State	Average Weekly Wages in 1969
Georgia	$110
Florida	118
North Carolina	123
Kansas	122
Wisconsin	159
California	188

agencies. However, the principles of classical organization theory have not been contradicted by the findings. The data available are not sufficient to answer the question of whether organizational structure is a prime factor causing effective agencies or whether it only reacts to other unidentified factors which affect both organizational structure and effectiveness. Available data are insufficient to develop and test more complicated models of organizational behavior, but these results should encourage additional quantitative study.

The findings of this study are summarized below. They should be read with the caution that they are only suggestive of associations which require further explanation before conclusions regarding cause and effect are attempted.

The potential for inter-agency conflict among Georgia water resource agencies is low because the limited authority of the agencies leads to relatively little overlap and duplication of programs. The historically minor importance of water resources in the State has contributed to this lack of conflict, but this may be expected to change with increased emphasis on environmental resources.

Opportunities for inter-agency conflict among Georgia water resources agencies are further diminished because the agencies are not in direct competition for appropriations. This results from the pattern of the State's budgeting process, in which the agencies initiate requests, the governor trims the increments of agency requests and coordinates requests of related agencies, and the legislature approves the governor's budget proposals with only minor changes.

Potential for inter-agency conflict between state and Federal agencies is high because many state and Federal programs overlap or duplicate each other. Federal water resources development programs have high potential for conflict with each other because of their multiple purposes and large scale.

Water resource agencies in Georgia are potentially responsive to legitimate authority, because the simple structure of organization and the small size of the agencies makes access to them direct and free of red-tape.

The governor's office is the only central administrative authority, and its capacity for coordination of administrative programs is low. As a result, agencies have become more responsive to the needs of their clientele. This is further encouraged by the administration of part-time boards.

Georgia agencies frequently neglect program planning and evaluation.

The review of plans for Federal water resources development by the State has been greatly neglected. This is particularly true of the major purposes in proposed Federal projects. Review which has taken place has concerned primarily fish and wildlife and water quality effects.

The State has been slow to adapt to changing opportunities for Federal assistance in water resources program areas outside the scope of existing agencies. This shortcoming has been most notable in state water resources planning.

The limited responsibilities of Georgia water resources agencies leave many program areas in water resources management inactive.

The public administration model of state government organization as interpreted in the research model provides a useful basis for describing organizational structure. The application of the research model to the natural resources organization of six states demonstrates that it is sensitive to differences in organizational ideas which are widely utilized in designing state governmental structure. The correlations between the index of deviation from the research model and measures of the adoption of innovations and level of state employees' wages appear to support this conclusion.

Comparative organization study of the fifty states offers excellent opportunities for statistical testing of hypotheses about organization. The states are well-established as statistical reporting units so that much data is readily available. The Federal form of government requires or encourages uniformity among the states which simplifies the identification and description of organizational form and function and makes the clarification of differences easier.

Formal aspects of organizational structure appear to be unexpectedly good indicators of other broad characteristics of state government.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The effects of formal organizational structure of the administrative branch of the state of Georgia on its functional programs of water resources management can be suggested from available data. However, the mere demonstration that supposed effects exist in one of a few instances in association with a particular organizational structure is not sufficient evidence to conclude that one causes the other. Numerous factors in addition to organizational structure contribute to any effect, and until more complex techniques of analysis are developed and the necessary data acquired, it will be impossible to prove the effect of any single factor. This investigation indicates, through regularities in the association of organizational structure and expected program effects, that organizational structure is a factor with enough significance to warrant its continued consideration in research and practice.

Of the six states studied, Georgia has by far the most decentralized structure of natural resources organization. This highly decentralized structure appears to contribute to a number of shortcomings in the functional water resources management programs of Georgia, some of which are described below:

1. A high potential for interagency conflict exists as a result of duplicative and overlapping programs among independent agencies. No regular mechanism for the resolution of interagency conflicts in natural resources has been

developed. The relatively low level of controversy over natural resources programs in Georgia may be expected to increase rapidly in the future as state programs expand and pressures to develop and to preserve natural resources increase. Significant conflicts between state agencies can be expected to increase rapidly.

2. The lack of central direction of natural resources policy in the State, which results in part from the diffusion of responsibility among numerous independent agencies, will become rapidly more inefficient and unsatisfactory as pressures on natural resources increase and Federal programs require more comprehensive planning and coordination. It is unrealistic to expect that a typical Governor of Georgia, elected to a single four-year term, sometimes with only limited administrative or legislative experience, can master the complexities associated even with the budgets of so many independent agencies before his term is nearly completed. In such a situation, it is unreasonable to expect him to give the programs the central direction which should be his responsibility.
3. New functional programs of resources management in Georgia are not easily started within existing agencies, because their narrowly defined responsibilities usually make legislative action necessary.
4. In comparison with other states, a high correlation between organizational structure and the rate of adoption of innovative programs by the states has been demonstrated. This correlation suggests that Georgia's form of organizational structure is closely associated with a marked reluctance to

adopt new programs which eventually become widely accepted.

5. The narrow focus of programs in Georgia water resources agencies has contributed to the shortage of positions for professionally trained personnel in a number of water resources specialties. Notable are the shortages or absences of positions for water resource economists, hydrologists, water resources lawyers, and water resources planners.
6. The lack of a state water resources planning program in Georgia is a glaring weakness, and it is probably associated with the decentralized structure of natural resources organization. However, water resources planning has been successfully added to the decentralized organization of Kansas, suggesting that a decentralized organizational form can add an independent planning program. Demands on water resources have been much greater in Kansas than in Georgia, but the feasibility of such an organizational pattern has been established.
7. Weaknesses of regulatory programs for water resources in Georgia, except for the protection of public health, appear to be related to the decentralized structure of organization. No operating agency has had as its concern the protection of public safety from flooding or dam failure or the protection of property rights in water. Existing regulatory programs in water, including water quality, are all related to the responsibility of the Health Department.
8. Through comparison with other states it appears that low wages for state employees are correlated with decentralized organizational structure. Georgia state employees are paid relatively low wages. Whether or not a

decentralized organizational structure is a significant factor causing low wages, it is not likely that low state wages contribute to improving governmental program performance.

The organizational characteristics of state natural resources administrative structure can be quantified using a Research Model derived from classical principles of organization. Calculation of an index of deviation from the Research Model for natural resources organization in each of six states gave comparative results substantially in accord with intuitive evaluations of the adequacy of the water resources organization in those six states. While this technique yields objective results which are generally consistent with subjective judgments, it does not indicate the causative reasons for the superiority of one organization over another. Classical principles of organization, which prescribe ideal structural characteristics, have been widely applied; however, their utility in accounting for effective organization has been seriously questioned and is doubtful. There does appear, nevertheless, to be a correspondence between organizational form and organizational effectiveness which may indicate the value of organizational structure as a clue to the location of more causative characteristics of effectiveness.

The Research Model does provide a direct, simple, quantitative tool for describing organizational structure objectively. It should be useful to practitioners and researchers in the study of the public administration of natural resources. Application of the model provides a systematic description of organizational form which can be compared readily to ideal structural forms and to other organizations. Such comparisons can suggest organizational changes which could be considered.

More satisfactorily, the model could be used to measure the effect of reorganization on organizational structure in order to define this change for association with detectable changes in organizational effectiveness.

An outline of an ideal state water resources program has been developed to aid in the diagnosis of areas of program weakness. This outline provides a convenient tool for preparing a rapid preliminary evaluation of the scope of existing and needed state water resources programs. Use of this outline also can help identify areas of potential conflict between agencies with overlapping program responsibilities.

Attempts to demonstrate that unjustifiable State support has been given to Georgia agencies with politically influential clienteles were inconclusive. Comparisons between state agencies are complicated by the need to consider the various sources of funds for their operation, the significance of each program within an agency, and the needs of the State for the agency's services.

The five states studied in addition to Georgia were selected because they were known to have more active water resources programs than that in Georgia. The study confirms this judgment. The contrast between California and Georgia is extreme. The scale of state government and the historic importance of water resources in California are so much greater that it is unreasonable to expect California's organization to serve as a detailed pattern for Georgia. However, it is worthy of note that in its effort to manage this large operation, California has followed the principles of classical organization theory throughout most of its state government. These principles are generally followed by practitioners in the design of state government organization, despite theoretical weaknesses in their development and verification.

Each of the states studied for comparison with Georgia, except Kansas, has a department of water resources which includes programs of water resources planning. Kansas retains several independent agencies with water resources programs, but it has added the Kansas Water Resources Board, which plans and coordinates water resources programs. Thus, two basic approaches to development of a comprehensive state water resources program are suggested. First, a water resources department would be formed from existing water resources programs and be given authority and responsibility to develop additional needed programs. Second, the Kansas approach would require less drastic organizational change and would in fact be largely in the Georgia tradition of creating a new agency for a new program. A significant reason for the success of the Kansas Water Resources Board has been its authority to coordinate water resources policy and to review and evaluate the budgetary requests of other water resources agencies for the governor and the legislature. Thus, the Kansas approach goes beyond simply creating a water resources planning agency.

Either approach would be expected to improve the water resources program of Georgia. The establishment of a water resources department would be a more satisfying solution, because it would require a clear indication from the governor and the legislature regarding the importance of water resources, and it would provide a focus for public attention which would be useful in the development of more comprehensive programs. Should the Kansas approach be attempted, it probably would be more difficult to obtain public support for what could appear to be simply a planning program. A new agency also could expect to find it difficult to obtain cooperation from existing agencies, which naturally tend to protect their autonomy. For Georgia, the Kansas approach might be a politically expedient step toward forming a water resources department, or it could be an ineffectual half-step reminiscent of the abortive efforts to establish a water planning program, which have persisted for more than a decade.

APPENDIX A

NATURAL RESOURCES ADMINISTRATIVE ORGANIZATION OF GEORGIA

This appendix describes the authority, organization, and programs of numerous state agencies which are concerned with water or related land resources use, planning, and development in Georgia. It is divided into three major sections: state agencies, interstate agencies, and special purpose districts.

State Agencies

Bureau of State Planning and Community Affairs

A State Planning and Programming Bureau was established in 1967 as a separate unit of the executive department, with the Governor as ex-officio Director of State Planning. Its purpose was to promote "the orderly growth and development of the State of Georgia through the proper planning and programming of the affairs of State Government" (Ga. Laws 1967, p. 252). In 1970 its name was changed to the Bureau of State Planning and Community Affairs, and an advisory State Planning and Community Affairs Policy Board was established. The Policy Board consists of the governor as chairman and five members: 1) a representative of the Georgia Municipal Association, 2) a representative of the Association of County Commissioners, 3) Chairman of the House Appropriations Committee, 4) Chairman of the Senate Appropriations Committee, and 5) a representative of the State Advisory Committee on Area Planning and Development. The Board will include the chairmen of House and Senate committees on community affairs when the committees are organized (Ga. Laws 1970, p. 321).

The Bureau is directed to provide planning and programming services, technical assistance, information, and advice to other public agencies. It is directed to encourage comprehensive and coordinated planning of the affairs of state government, and it may prescribe systems of records and standards for effective planning and programming by state government. It assists the governor in preparing a biennial development program which he submits to the legislature for their consideration.

The administrative head of the Bureau is the State Planning Officer, appointed by the governor.

Though designated as the water resources planning agency of the State, as required to obtain Federal assistance under the Water Resources Planning Act of 1965, the Bureau is not currently active in water resources planning. It did conduct a water resources pre-planning study in 1967.

Department of Industry and Trade

The Department of Industry and Trade is directed by a Board of Commissioners appointed by the governor for six-year terms. It has 20 members, two from each of the ten Congressional Districts (Ga. Const., Art. 5, Sec. 10).

The Board appoints the Director of the Department, who serves as its executive officer and administrative head and assists the Board in carrying out its duties. The duties of the Board are generally to promote the growth and development of Georgia business, industry, commerce, and resources through planning, publicity, information collection and dissemination, and cooperation with local governments and business (Ga. Code Ann., Chap. 40-21).

The Administrative Division of the Department sponsors conferences, seminars, and tours to promote Georgia industry.

The Industry Division is responsible for creating and directing a program to attract new industry to the State.

The Research Division provides economic data on the State, primarily for the use of industry. It keeps a basic data file on the resources of the State and a list of new and expanded industries in the State. In cooperation with the Georgia Institute of Technology's Industrial Development Division and others, it makes feasibility and marketing studies to encourage industrial expansion.

The Tourist Division undertakes to advertise, sell, and promote tourism in Georgia.

The Aviation Division assists local communities in securing Federal grants-in-aid for airport development.

Georgia Ports Authority

The Georgia Ports Authority is a public authority which promotes, develops, and operates terminal facilities at river and ocean ports of the State. The Authority has seven members appointed by the governor to four-year terms (Ga. Code Ann., Chap. 98-2).

The Authority constructs and operates terminal facilities at the ports of

Savannah, Augusta, Brunswick, Bainbridge, and Columbus. It finances the construction of these facilities by means of revenue bonds and state appropriations. Funds from the State are provided through leases with the Department of Industry and Trade.

Law Department

The Law Department is headed by the Attorney General, who is a constitutionally elected official serving a four-year term (Ga. Const., Art. 6, Sec. 10). He may succeed himself in office.

The Attorney General represents the State in the Georgia Supreme Court and acts as legal advisor to the executive department. He is an ex-officio member of state construction authorities and regulating bodies including the Mineral Leasing Commission and the Coastal Marshlands Protection Agency.

The Law Department provides legal services to administrative agencies, notably in enforcing regulations such as those of the Water Quality Control Board.

Public Service Commission

A Public Service Commission for the regulation of utilities was established under the Georgia Constitution (Ga. Const., Art. 4, Sec. 4, Par. 3). The Commission consists of five members elected to six-year terms. It regulates the rates and services of certain public utilities (electric, telephone, telegraph, natural gas, and transportation). It also supervises the state-owned Western and Atlantic Railroad (Ga. Code Ann., Title 93). Its jurisdiction over the sale of water by public utilities was removed by the legislature in 1960 (Ga. Laws 1960, p. 800).

Georgia Recreation Commission

The Georgia Recreation Commission was formed in 1963 "to formulate, in cooperation with other State agencies, interested organizations, and citizens a comprehensive recreation policy for the State of Georgia." The Commission, consisting of one citizen from each of the ten Congressional Districts, is appointed by the governor to four-year terms. It is empowered to employ a professional executive director and a permanent staff. Its duties include formulating state recreation policy, studying and publicizing recreation needs, assisting local interests in planning recreation facilities and programs, and recruiting, educating, and placing recreation workers (Ga. Code Ann., Chap. 99-23). Its programs have included promotion of water oriented recreation.

Secretary of State

The Secretary of State is a constitutionally elected official who serves a four-year term and may succeed himself in office (Ga. Const., Art. 4, Sec. 2).

His office has numerous duties, including operation of the state examining boards which register or certify professional engineers and water and waste-treatment plant operators.

The Secretary of State is an ex-officio member of statewide construction authorities and of the Mineral Leasing Commission.

The duties of the Surveyor General of Georgia were added to those of the Secretary of State in 1783 (Ga. Code Ann., Sec. 40-604). Since the granting of the last state public lands in 1861, this responsibility involves only the preservation of records of original land grants and sales from the time Georgia became a royal colony in 1752 until 1861. Though primarily of historical importance, these records are also useful in establishing the location of state and other old boundaries. They have recently gained significance because the Attorney General has ruled that the tidal marshes are state property unless private ownership can be traced to a royal grant.

Department of Agriculture

The Department of Agriculture is headed by the Commissioner of Agriculture, who is elected to a four-year term (Ga. Const., Art. 5, Sec. 2). The Commissioner is authorized to investigate the subject of irrigation and to collect and publish information on geology and soil conditions (Ga. Code Ann., Chap. 5-1), but this authority has not been exercised since the 19th Century.

The only programs of the Department which deal with water do so indirectly through the inspection of slaughter-houses and food processing plants. Such operations are not certified by the Agriculture Department until the State Health Department has approved their water supply and waste disposal facilities.

Division of Conservation

The Division of Conservation, when created in 1943, included the Departments of Forestry; Mines, Mining, and Geology; and State Parks, Historic Sites, and Monuments (Ga. Laws, 1943, p. 181). The Department of Forestry was moved out of the Division in 1949 (Ga. Laws 1949, p. 1079). The ex-officio Commissioner of Conservation was designated as the "highest executive officer in the Executive Department of Georgia." Customarily the governor has assumed this position, and the Division has existed in name only. In 1969 the governor named his executive secretary as Commissioner of Conservation, and the legislature designated the Division of Conservation as the state agency to administer the requirements of the Federal Land and Water Conservation Fund Act (Ga. Laws 1969, p. 855). In 1970, the governor was given the authority to designate any executive department agency to administer the Land and Water Conservation Fund (Ga. Laws 1970, p. 183).

State Forestry Commission

The State Forestry Commission has five members appointed by the governor (with Senate consent) for terms of seven years. Three members represent owners of at least 50 acres of forest land in the State, and two represent manufacturers or processors of forest products (Ga. Code Ann., Chap. 43-2). The Commission is required to encourage reforestation and better forestry practices through research, technical assistance to forest landowners, fire prevention, and cooperation with other agencies.

The Commission, with the advice and consent of the governor, appoints a Director, who serves as its executive secretary and administrative officer.

The fire protection program of the Commission, to which the counties make financial contributions, has covered all rural areas of the State since 1967. This program accounts for the major share of the Commission's budget and personnel. Its reforestation program produced more tree seedlings than that of any other state. The Commission also assists forest owners and farmers in planning for management and protection of their forestland, and it operates the 72,000-acre Waycross State Forest.

Georgia Forest Research Council

The Georgia Forest Research Council was formed in 1953 to perform research for the benefit of forestry in Georgia and to coordinate the forestry research of other agencies (Ga. Code. Ann., Chap. 43-8). The Council is headed by a board of seven commissioners, six appointed by the governor to nine-year terms, plus the Director of the Georgia Forestry Commission.

Research projects performed or sponsored by the Council have concerned fire protection, genetics, nurseries, pine plantation management, forest physiology, and forest soil including studies of soil moisture.

Georgia Game and Fish Commission

The Georgia Game and Fish Commission was made a constitutional body in 1943 (Ga. Const., Art. 5, Sec. 4). It consists of 11 members appointed by the governor and confirmed by the Senate for seven-year terms. One member is appointed from each of the ten Congressional Districts plus one from the six coastal counties.

The Commission is empowered to appoint a Director to serve as its executive secretary and as the administrative officer of the Game and Fish Department. Its other duties and powers include (1) acquisition of lands and waters for game and fish management programs, (2) regulation of hunting and fishing, (3) stocking of game and fish, (4) enforcement and administration of the State Motorboat Numbering Act, (5) cooperation with educational institutions and governmental agencies, and (6) insuring free passage for fish in fresh water streams by requiring fishways in dams (Ga. Code Ann., Chap. 45-1).

The Department operates eight fish hatcheries from which it provides fingerlings for stocking lakes and ponds. Law enforcement is the Department's major function, and the majority of its employees are uniformed rangers. The Department also manages hunting and fishing areas across the State. In cooperation with counties, it constructs public access areas on streams for fishing and boating. It uses Federal matching funds for operating research programs in fish and game management.

Coastal Marshlands Protection Agency

The Coastal Marshlands Protection Agency was authorized in 1970 as an autonomous division of the Game and Fish Commission (Ga. Laws 1970, p. 939). It is composed of the following seven members or their representatives: 1) the Director of the Game and Fish Commission, 2) the Executive Director of the Ocean Science Center of the Atlantic, 3) the Executive Director of the Water Quality Control Board, 4) the Director of the Coastal Area Planning and Development Commission, 5) the Executive Director of the Department of Industry and Trade, 6) the Director of the Department of Industry and Trade, and 7) the State Attorney General.

The Agency was created to control development or alteration of the coastal marshes by excavating, filling, draining, or dredging so as to protect the biological productivity of the marshes. These activities require permits from the Agency, which has been given the authority to establish, administer, and enforce rules and regulations; to grant or deny permits to alter the marshes; and to revoke permits. Significant exceptions to the authority of the Agency are: 1) the State

Highway Department, 2) navigation facility maintenance by the U.S. Corps of Engineers, 3) public utilities, 4) railroad lines and bridges, 5) water and sewer lines built by municipalities, and 6) private docks built on pilings above the level of the marsh grass.

Georgia Commission for the Development of the Chattahoochee River Basin

The Georgia Commission for the Development of the Chattahoochee River Basin was created by the 1967 General Assembly for the purpose of:

> encouraging and promoting the expansion and development of the full economic, industrial and recreational potential of the Chattahoochee River and its tributaries. By way of illustration and not of limitation, said Commission shall encourage and promote the development of navigation to Atlanta, trade and other commercial facilities, flood control, water supply, pollution abatement, hydro-electric power generation, recreation, protection and propagation of fish and wildlife, and the proper flow of dam-controlled water discharge (*Ga. Laws 1967*, p. 805).

The Commission consists of 40 members--20 appointed by the Governor and one appointed by each of the governing authorities of the 20 basin counties, all to four-year terms.

The Commission has the power to receive and administer appropriations, gifts, and grants; to secure cooperation of other state agencies; to employ an executive director and other personnel; and to make contracts. Its duties are to formulate a comprehensive program and plan for the development of the Chattahoochee River basin in cooperation with other governmental agencies and to submit an annual report to the Governor and the legislature. It has studied the economic impact to be expected from development of proposed navigation projects.

Altamaha River Basin Commission

The Altamaha River Basin Commission was established in 1970 to promote the full development of the economic, industrial, and recreational potential of the Altamaha basin. The Commission has 69 members serving four-year terms. The governor appoints 23 of the members from the 46 counties of the basin. The authorities of the 46 counties each appoint one member. The members elect a chairman. They may hire a full-time executive director and a staff which will be under the state merit system. An annual report to the governor and the legislature is required (Ga. Laws 1970, p. 632).

Topics suggested by the legislation for consideration of the Commission include navigation to Atlanta, trade and commercial facilities, flood control, water supply, pollution abatement, hydropower, recreation, fish and wildlife, and control of dam discharges.

Mineral Leasing Commission

The Mineral Leasing Commission is an ex-officio agency consisting of the governor, the Secretary of State, the Director of the Department of Mines, Mining, and Geology, and the Attorney General (Ga. Code Ann., Chap. 91-1). It meets as required to consider proposed leases for mining on state property, primarily in coastal waters and marshes.

Department of Mines, Mining, and Geology

The Department of Mines, Mining, and Geology is headed by a Director appointed by the governor with approval of the Senate for a four-year term. He must be a graduate geologist (Ga. Code Ann., Sec. 43-117 to 43-119.4).

The specific duties of the Department include: 1) surveying the mineral and geological resources of the State, 2) preparing topographic maps of the State, 3) making studies to aid development of mineral and water power resources, and 4) prospecting for ground water supplies. The Department may conduct cooperative investigations with the Federal Government on a matching fund basis (Ga. Code Ann., Sec. 43-118).

The Department offers limited services in investigating mineral properties, assaying ore and rock samples, and making chemical analyses of waters for industries, municipalities, and individuals. It collects and disperses information on the mineral resources of the State. The Department has sponsored an intensive exploration for minerals in south Georgia which began in 1965 under a contract with the Georgia Institute of Technology.

Other activities of the Department are carried on through matching-fund programs with the U. S. Geological Survey. These include stream flow measurement, water quality studies of surface and ground water supplies, and statewide topographic mapping. Special water supply studies requested by several Georgia cities have been conducted as Federal matching-fund programs, with the state's share of funds supplied by the cities.

Surface Mined Land Use Board

The Surface Mined Land Use Board was created in 1968 as an autonomous division of the Department of Mines, Mining, and Geology (Ga. Laws 1968, p. 9). The Board has 11 members, of which nine are appointed by the governor to four-year terms, one is a state senator, and one a state representative. The governor's appointees are designated as follows: 1) a forester, from nominees of the Forestry Commission; 2) a geologist, from nominees of the Department of Mines, Mining, and Geology; 3) a wildlife biologist, from nominees of the Game and Fish Commission; 4) a water quality control engineer, from nominees of the Water Quality Control Board; 5) a soil conservationist, from nominees of the State Soil and Water Conservation Committee; 6) an active surface miner, from nominees of the Georgia State Chamber of Commerce; and 7) three representatives of segments of the surface mining industry, from nominees of the Associated Industries of Georgia.

The purposes of the Board are to protect fish and wildlife, to restore land and water resources damaged by surface mining, and to assist the development of the mining industry. To accomplish these objectives, the Board licenses and regulates mining operators according to plans which operators must submit for approval. Operators are also required to submit performance bonds of up to 500 dollars per acre to encourage compliance with plans for operation and reclamation.

North Georgia Mountains Commission

The North Georgia Mountains Commission was established in 1963 to acquire, construct, operate, and promote recreation, accommodations, and other tourist facilities and services in 23 counties in north Georgia. The Commission consists of seven members, as follows: the State Auditor and the Chairman of the Georgia Mountains Planning and Development Commission, both ex-officio; three members appointed by the governor from the north Georgia mountains area as a whole; and two members appointed by the governor as representatives of the State-at-large. Appointed members serve six-year terms. The Commission has been given general powers which include making contracts and leases, exercising eminent domain, and issuing revenue bonds exempt from taxation in Georgia (Ga. Code Ann., Chap. 99-27.)

Georgia Science and Technology Commission

The Georgia Science and Technology Commission was established in 1964 to advise the governor, the legislature, and state agencies on the promotion of scientific research and development (Ga. Laws 1964, p. 717; Ga. Code Ann., Chap. 43-10). The Commission has 30 to 40 members appointed by the governor to six-year terms. An executive committee of not more than nine members may act for the Commission. The governor is an ex-officio member of both groups.

The Commission appoints a Director to head its staff and a Scientific Advisory Committee to advise it on policy and program emphasis.

The Commission promoted the formation of the Ocean Science Center of the Atlantic through its oceanography task force. It has also been instrumental in the formation of the Coastal States Organization through the National Governor's Conference. Other activities of the Commission have included studies and increasing the biotechnology industry in the State, development of technological manpower resources, and the effects of technological innovation.

Ocean Science Center of the Atlantic Commission

The General Assembly created the Ocean Science Center of the Atlantic Commission in 1967 to "plan, promote and develop an oceanographic research complex" on the Georgia coast (Ga. Laws 1967, p. 12). Following the establishment of the Ocean Science Center of the Atlantic on Skidaway Island, the legislature in 1969 replaced the Commission with a 15-member board of trustees and expanded the mission of the Center to include establishment of marine resources extension centers. The members of the board are: 1) the Secretary of State, 2) the Chancellor of the University System, 3) the Chairman of the Science and Technology Commission, 4) the Chairman of the Department of Industry and Trade, 5) the Chairman of the Ports Authority, 6) one state senator and one representative, 7) five members appointed to six-year terms by the governor from nominees of the Science and Technology Commission, and 8) three members appointed to six-year terms by the governor from nominees of the Board of Regents (Ga. Laws 1969, p. 755).

The Center owns 680 acres on Skidaway Island near Savannah on which it proposes to develop the oceanographic research complex. The Skidaway Institute of Oceanography, a non-degree granting graduate institute affiliated with the University System of Georgia, presently occupies a portion of this property. The first of several proposed marine resources extension centers will also be located there.

Department of State Parks

The Department of State Parks is headed by a Director appointed by the governor with the consent of the Senate for a four-year term (Ga. Code Ann., Sec. 43-109).

The primary responsibility of the Department is the management of the state park system. Its other powers and duties include the study of park and recreational needs and resources in cooperation with other agencies and the acquisition of land for parks by purchase, lease, agreement, or condemnation. Receipts from operation of state parks go into a fund for maintenance and acquisition of lands (Ga. Code Ann., Sec. 43-120 to 43-134).

The state system has 44 parks. Water-based recreation is an important part of its program as most parks offer fishing and a number offer water skiing. Several parks have been located on major reservoirs.

Jekyll Island--State Park Authority

The Jekyll Island--State Park Authority is a public corporation which finances, constructs, and operates vacation and recreation facilities at Georgia state parks, particularly at Jekyll Island State Park. It replaces the original Jekyll Island State Park Authority. The authorizing legislation extends its responsibilities to other state parks (Ga. Laws 1963, p. 391). The five ex-officio members of the Authority are the Secretary of State, the Attorney General, the Chairman of the Public Service Commission, the State Auditor, and the Director of the Department of State Parks (Ga. Code Ann., Chap. 43-6A).

Lake Lanier Island's Development Authority

The Lake Lanier Islands Development Authority is a public corporation formed to develop the recreation potential of islands in Lake Lanier which were licensed to the State by the Corps of Engineers for a state park (Ga. Laws 1962, p. 736; Ga. Laws 1964, p. 731; Ga. Laws 1968, p. 1132; Ga. Laws 1969, p. 397). The nine members of the Authority are the Secretary of State; the Directors of the Game and Fish Commission, the Department of Industry and Trade, and the State Parks Development; the President of the Upper Chattahoochee Development Association; and four members appointed by the governor to four-year terms. Two of the four appointed members must be members of the Upper Chattahoochee Development Association.

In 1969 the Authority was also made the Lake Lanier Islands Development Commission (Ga. Laws 1969, p. 392). As the Authority, it will issue revenue bonds and incur debt outside the constitutional debt limit. As the Commission, it will operate as a state agency eligible for a state appropriations and empowered to lease facilities from the Authority.

An extensive resort development on Lake Lanier has been planned and is being developed. It will include tourist accommodations, vacation home sites, a golf course, boating facilities, and other services and facilities.

Groveland Lake Development Authority

The Groveland Lake Development Authority was established in 1969 to plan, develop, and operate a recreational lake and related facilities in south Georgia. The Authority has 20 members--one appointed by the Governor from the Georgia Southern Area Planning and Development Commission, the commanding officer of the Hunter-Fort Stewart military complex, and one representative each of the governing bodies of 18 counties.

Natural Areas Council

The Natural Areas Council was established in 1966 as the Council for the Preservation of Natural Areas, for the purpose of identifying and preserving tracts of land of unique scientific interest (Ga. Laws 1966, p. 330; Ga. Code Ann., Chap. 43-12). In 1969 the Council was given its present name and had its mission and authority expanded (Ga. Laws 1969, p. 750). It is now charged with identifying natural areas of ecological significance and preserving them in their natural state for scientific study and education, public enjoyment, environmental quality enrichment, and recreation. The Council has 14 members, one appointed by each of the following: 1) the Game and Fish Commission, 2) the Forestry Commission, 3) the Director of the State Parks Department, 4) the Executive Director of the Water Quality Control Board, 5) the Soil and Water Conservation Committee, and 6) the State Planning Advisory Committee. Four members appointed by the Georgia Association of Colleges include two from the University System and two from private colleges. Additionally, four members from the legislature are appointed, one each by the chairmen of the House and Senate Committees on Game and Fish and on Natural Resources. The Council may employ an executive director and a staff. It operates within the State Parks Department.

The Council administers the Scenic Rivers Act of 1969 (Ga. Laws 1969, p. 933), under which it studies free flowing rivers and recommends to the legislature those which should be designated for protection from dam building and other development. Under this act, the Council may acquire land along those rivers designated for protection by the legislature.

State Soil and Water Conservation Committee

The State Soil and Water Conservation Committee consists of five soil and water conservation district supervisors appointed by the governor to four-year terms. It is supported by an ex-officio advisory group consisting of the directors of the State Agricultural Extension Service, the Georgia Agricultural Experiment Station at Experiment, and the Georgia Coastal Plans Experiment Station at Tifton; the State Conservationist of the U.S. Soil Conservation Service; the Dean of the State College of Agriculture at Athens; the Director of Vocational Agriculture in Georgia; and the Commissioner of Agriculture (*Ga. Code Ann.*, Sec. 5-1807 to 5-1810).

The Committee was formed in 1937 to encourage the organization of soil conservation districts. Twenty-seven districts have been organized, which together cover the entire State. The Committee assists the district boards of supervisors in carrying out their programs by facilitating information exchange, coordinating district programs, and securing cooperation and assistance from counties and Federal agencies. It represents the districts in securing appropriations from the legislature.

Environmental Resources Center

The Georgia Institute of Technology was designated by the 1965 legislature as "the State agency of the State of Georgia to establish and operate a center to be known as the Water Resources Center, or such other name as may be approved by the Board of Regents for the purpose of conducting research, investigations, experiments and training in relation to water and resources which affect water." The Center was specifically "authorized to make application for and receive from the Federal Government such funds and grants as shall be available under Public

Law 88-379 of the 88th Congress (78 Stat. 329)... for such purposes and projects as will carry out the purposes of such a center" (Ga. Code Ann., Chap. 17-4). In accordance with this provision, the Center was subsequently designated by the Office of Water Resources Research, Department of Interior, to administer the cooperative research program funded under the provisions of the Federal Water Resources Research Act of 1964 (Public Law 88-379).

The Water Resources Center had been established as a unit of the Georgia Institute of Technology by action of the Board of Regents of the University System of Georgia in 1963. In March 1970, the Board of Regents authorized the establishment of the Environmental Resources Center at the Georgia Institute of Technology. Among its several responsibilities, the Environmental Resources Center carries on the work of the Water Resources Center, which it replaces.

The Environmental Resources Center, like the Water Resources Center before it, is a state agency only to the extent that the legislature was required by Federal law to designate the Georgia Institute of Technology as the university which would administer P. L. 88-370 in the State. It is not included in subsequent discussions of state agencies.

Department of Public Health

The State Department of Public Health is supervised by an 18-member Board of Health. The Board members are appointed to six-year terms by the governor (with Senate confirmation) from candidates proposed by the Medical Association of Georgia, the Georgia Dental Association, the Georgia Pharmaceutical Association, the Georgia Veterinary Association, the Georgia Municipal

Association, and the Association of County Commissioners. The Board elects the Director of the Department, subject to the approval of the Governor. The Department is given broad powers to safeguard and promote the health of the people of the State (Ga. Code Ann., Sec. 88-103).

Provisions of the "Georgia Health Code" make certification of public water supply systems the responsibility of the Health Department (Ga. Code Ann., Chap. 88-26). These provisions were adopted by the 1964 legislature after the Water Quality Control Board had been created to carry on a pollution control program which included the certification of sewage and industrial waste collection and treatment systems.

Those activities of the Health Department which deal with water resources are in the Water Supply and the Engineering-Sanitation Services of the Environmental Health Branch, Division of Physical Health. The Water Supply Service must approve and certify all public water supplies before they can be built or operated legally. It requires that, for any proposed public water system, two copies of the plans and an engineering report be submitted to the Service for review and approval. The Service requires the monthly submission of water samples and operating records from all public water supplies (Official Compilation: Rules and Regulations of the State of Georgia, Sec. 270-5-15).

The Engineering-Sanitation Service becomes involved in water management through the Board of Health's regulation requiring construction permits for all impoundments of over one-tenth of an acre in size as a malaria control measure (Official Compilation: Rules and Regulations of the State of Georgia, Sec. 270-5-3). The sanitarians of local health departments report new impoundments and notify their owners of the State's requirements for malaria control and certification. The Engineering-Sanitation Service issues permits to the owners after prescribed mosquito control measures have been taken.

Water Quality Control Board

The Water Quality Control Board consists of nine members appointed by the governor to four-year terms. The members are representatives of the following agencies or interests: the State Health Department, soil and water conservation, municipal government, commerce, agriculture, industry, recreation and fish and wildlife, county government, and the public-at-large. The Health Department representative is designated as Chairman of the Board (Ga. Code Ann., Chap. 17-5).

The operating arm of the Board is the Division for Water Quality Control, which is established as an administrative division of the State Health Department. The Division depends on the State Health Department for administrative support, but it operates under the independent policy guidance of the Board. The Board appoints an Executive Secretary to serve as executive head and administrative officer of the Division. The Executive Secretary must be a sanitary engineer.

The Board has been given broad powers to conduct a program of water pollution control in the State. It may adopt rules and regulations concerning water quality which have the force of law; it may establish water quality standards; it may hold hearings; conduct investigations and inspections; issue orders to abate pollution or obtain specified operating results; and seek injunctions to prevent or control water pollution. The Board is charged with surveying the quality of the waters of the State and preparing a comprehensive general plan for pollution control. It has the authority to cooperate with Federal, state, and local agencies working in Georgia (Ga. Laws 1964, p. 416; Ga. Code Ann., Chap. 17-5).

The Board has adopted the rule that all wastewater discharges to the streams and lakes of the State must receive at least the equivalent of secondary treatment (Official Compilation: Rules and Regulations of the State of Georgia, Sec. 730-6-03). A major program of the Division is that of seeking compliance with this regulation by the municipalities and industries of the State. Initially a voluntary compliance program has been utilized to bring waste discharges within the minimum standard; however, some formal enforcement actions have been taken in accordance with statutory procedures.

A second major program of the Division has been the establishment of water quality standards for interstate streams, as required by the Federal Water Quality Act of 1965 (Public Law 89-234). The standards (Official Compilation: Rules and Regulations of the State of Georgia, Chap. 730-3) were approved by the Federal Water Pollution Control Administration in July 1967 and are now in force. The Division also reviews waste treatment plant designs, approves waste treatment plant construction grant applications by municipalities, and enforces marine waste treatment regulations.

State Highway Department

The State Highway Department is governed by the State Highway Board and headed by the Director of the State Highway Department who is appointed by the Board. The ten members of the Board are each elected by the members of the legislature from one of the ten Congressional Districts. They serve five-year terms (Ga. Const., Art. 5, Sec. 11, Para. 1; Ga. Code Ann., Chap. 95-16).

Highways have many direct and indirect effects on water resources management in the State. In recognition of some of these effects the Department Planning Division sends preliminary highway plans to the State Game and Fish Commission and to the U. S. Soil Conservation Service for their review and comment. The Department takes measures to control soil erosion of highway embankments and shoulders. Construction methods are controlled to reduce pollution of water supplies and silting of reservoirs from highway construction.

More directly related to water resources management are the Highway Department's program for collection and analysis of information on floods. Two programs are presently in operation. The first provides for gaging of flood crest stages and discharges on about 70 drainage areas of from 17 to 1000 square miles. This program is operated by the U. S. Geological Survey and financed as a matching fund program by the Highway Department and the U. S. G. S. The second program, begun in 1963 and scheduled to be completed in 1975, involves the recording of flood hydrographs on about 100 drainage areas of from 0.2 to 17 square miles. Rainfall measurements are made at many of the sites. This program also is operated by the U. S. G. S., but it is financed by Federal-aid highway planning and research funds and state matching funds.

Georgia Waterways Commission

The Georgia Waterways Commission consists of a chairman and six members appointed by the governor to four-year terms. One member represents the state-at-large and five represent major river basins--the Savannah, Chattahoochee, Altamaha, Etowah, and Flint basins. The Commission is authorized to promote the development of Georgia's rivers by state and Federal authorities. It may present testimony before Congressional committees concerning appropriations for river development. During its entire existence, the legislature has authorized a total of only 10,000 dollars for the commission for personnel and expenses. It follows that the commission operates without a staff (Ga. Code Ann., Chap. 17-3).

Engineering Advisory Board

The Engineering Advisory Board was created by an Executive Order of the Governor dated January 23, 1960. It originally consisted of five members appointed by the governor from nominees submitted by the Georgia Society of Professional Engineers. After serving two governors, the Board was ignored by a third, and it is therefore considered defunct by at least one member.*

The Board was created to advise the Governor on technical aspects of certain civil works projects when he so requested. It has reviewed and held hearings on water resources development projects of the Corps of Engineers and the land and water plan of the U.S. Study Commission, Southeast River Basins.

Rivers and Harbors Development Commission

By resolution of the 1967 General Assembly (Ga. Laws 1967, p. 516), a Rivers and Harbors Development Commission, consisting of the governor, the State Auditor, and the State Attorney General was created to cooperate in river and harbor development projects approved by Congress for development in Georgia. Appropriations for the state's share in river and harbor projects built by the Corps of Engineers have been made through the Commission.

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*Telephone conversation between the author and board member Robert E. Stiemke on August 31, 1970.

Interstate Agencies

Resources Advisory Board, Southeast River Basins

As recommended in the report of the U. S. Study Commission for the Southeast River Basins, the Resources Advisory Board, an interstate agency, was organized in March 1964 by Georgia, Florida, and Alabama. It now also includes South Carolina and Mississippi. Functions of the Board are to provide information on the need for conservation, development, and use of the land and water resources in the southeast; to encourage cooperation among Federal, state, and local agencies in planning and developing water resources; and to encourage implementation of the comprehensive plan for land and water resources development recommended by the United States Study Commission, Southeast River Basins. The Board has six members, one from each participating state, appointed by its governor, plus a chairman from the Southeast River Basins area, selected by the state members. A small staff carries on the activities of the Board which is headquartered in Atlanta.

Georgia's participation in activities of the Board is authorized by a resolution of the General Assembly (Ga. Laws 1964, p. 244). The resolution provides for financial support and authorized the governor to appoint a representative to the Board who is to serve at the governor's pleasure, with no compensation other than for actual expenses.

Southeast Basins Inter-Agency Committee

The Southeast Basins Inter-Agency Committee was organized in October 1964 under a charter adopted on December 19, 1963, by the Federal Inter-Agency

Committee on Water Resources. The charter was issued as provided by the "Inter-Agency Agreement on the Coordination of Water and Related Land Resources," approved by the President on May 26, 1954.*

The Committee has 11 members: five state representatives from Alabama, Florida, Georgia, South Carolina, and Mississippi; one from the Resources Advisory Board; and seven Federal agency representatives from the Departments of Agriculture; Army; Commerce; Interior; Health, Education and Welfare; and Labor; and the Federal Power Commission.

The responsibility of the Committee is to establish means and procedures to promote coordination of the water and related land resource development and activities in the Southeast River Basins by the states, Federal agencies, and private and local interests; to resolve problems at the regional level; and to suggest to the states or to the Water Resources Council changes in law or policy which would promote coordination, or resolution of problems.

The Committee has established three standing subcommittees--the Subcommittee on Review and Coordination, the Subcommittee on Program Information and Scheduling, and the Subcommittee on Basic Data and Research. These are the action elements of the Committee, through which its coordination activities are largely effected.

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*The Inter-Agency Committee on Water Resources was abolished by Executive Order dated April 10, 1966, and the Southeast Basins Committee continues under the aegis of the Water Resources Council, established by the Water Resources Planning Act of 1965.

The Appalachian Regional Commission

The Governor of Georgia is one of the 12 state members of the Appalachian Regional Commission, which was established under the Federal Appalachian Regional Development Act of 1965 (Public Law 89-4). The act reads in part "to provide public works and economic development programs and the planning and coordination needed to assist in development of the Appalachian region" through state-Federal programs.

Thirty-five counties in northern Georgia are included by the act in the Appalachian region. The Appalachian Planning Section of the Bureau of State Planning and Community Affairs coordinates Georgia's part in the program.

The Southeast Coastal Plains Regional Commission

The Governor of Georgia is one of three state members of the Coastal Plains Regional Commission. Also represented are North Carolina, South Carolina, and the Federal government. The Commission was established under provisions of the Federal Public Works and Economic Development Act of 1965 (Public Law 89-136). It has purposes similar to those of the Appalachian Regional Commission above. The Bureau of State Planning and Community Affairs coordinates Georgia's participation.

Atlantic States Marine Fisheries Commission

The Atlantic States Marine Fisheries Commission was formed by compact among 14 Atlantic coast states to promote and coordinate the development of marine fisheries. It is an advisory body supported by contributions from the member states. The U. S. Fish and Wildlife Services provides it with technical advice and research facilities.

Under the "Atlantic States Marine Fisheries Compact" (Ga. Code Ann., Sec. 45-123 to 45-129) each state appoints three commissioners. Georgia's representatives are the Director of the Department of Game and Fish, a legislator who is a member of the State Commission on Interstate Cooperation, and an informed and interested citizen appointed for three years by the Governor with Senate approval.

Coastal States Organization

The Coastal States Organization was formed in 1970 in response to a recommendation of the 1969 National Governor's Conference. Its Governing Board consists of delegates appointed by the governors of states having an ocean, Gulf of Mexico, or Great Lakes boundary; Puerto Rico; the Virgin Islands; and American Samoa. It will represent the states' collective interests in determining national coastal resource and marine science policies; it will help solve common state problems of seaward boundaries, pollution, fisheries, multiple-purpose water uses, and other marine resource problems; it will serve as a clearing house for information on marine activities; and it will develop common policies for the development of a national coastal zone management program ("Articles of Organization of the Coastal States Organization," draft copy furnished by the Georgia Science and Technology Commission, August, 1970).

Special Purpose Districts

Sanitary Districts

The Georgia Constitution authorizes the legislature to "district the territory of any county, outside the limits of incorporated municipalities, for the purpose of providing systems of waterworks, sewerage, sanitation, and fire protection; and authorize such counties to levy a tax only upon the taxable property in such district for the purpose of constructing and maintaining such improvements (Ga. Const., Art. 7, Sec. 4, Par. 2). Sewage or water and sewage districts have been established in some counties.

Soil and Water Conservation Districts

Twenty-seven soil and water conservation districts covering the entire State have been formed by the State Soil and Water Conservation Committee on petition of local landowner and approval by local referendum. The boundaries of a district are approved by the committee, considering topography, soils, erosion, land-uses, benefits from inclusion, and relation to other districts. Each district is governed by a board of supervisors. Two supervisors are appointed by the State Committee, and one is elected by the landowners from each county in the district, with the minimum total of elected supervisors being three. Supervisors serve three-year terms. They are given powers to conduct surveys and research on soil erosion, to conduct demonstration projects, to carry out soil erosion control measures themselves and in cooperation with other State and Federal agencies, and to require contributions from landowners who benefit. The supervisors may formulate land use regulations, which become obligatory after approval of the State Committee and a favorable referendum by the landowners. The supervisors may use the power of eminent domain to acquire the final ten per cent of property required for any small watershed project

(Ga. Code Ann., Chap. 5-19 to 5-22).

Soil and water conservation districts in Georgia serve as an intermediary in obtaining the assistance of the U. S. Soil Conservation Service and Federal soil conservation programs for local areas. The districts have not adopted land uses regulations or made wide use of their other powers.

Area Planning and Development Commissions

Seventeen multi-county "area planning and development commissions" have been formed in Georgia. Commissions will cover all of Georgia's 159 counties by 1971 under provisions of the act creating the Bureau of State Planning and Community Affairs (Ga. Laws 1970, p. 321). The commissions are directed by board of directors appointed by the governing bodies of the political subdivisions making up the commission area (Ga. Code Ann., Chap. 69-12).

These commissions carry on programs of land use and transportation planning; give assistance to local county and municipal planning commissions; conduct research activities such as mapping, inventories of land use, and economic, demographic, and natural resource studies; make resource development studies to identify development prospects for commerce, industry, agriculture, tourism, recreation, and governmental services; and perform public information services. They receive technical and financial support from the Bureau of State Planning and Community Affairs.

Tributary Area Development Associations

With the guidance of the Tennessee Valley Authority, three tributary area development associations which include parts of Georgia have been organized.

These associations are non-profit corporations formed to plan and promote the development of the natural and human resources in their areas. They try to secure the cooperation and membership of city and county governments, rural electric cooperatives, chambers of commerce, farm, civic, and trade organizations, and of local residents and businesses interested in their objectives. The TVA provides technical assistance when requested by the associations. Their operating funds are raised through membership subscriptions.

Upper Hiawassee Watershed Development Association. This association, covering Fannin, Union, and Towns Counties in Georgia and Clay and Cherokee Counties in North Carolina, was chartered in July 1962 by the Superior Court of Towns County. It completed an inventory of its resources in 1965 and has begun a number of programs to take advantage of development opportunities which the inventory identified. These programs include a water quality survey, information for counties and towns on water supply sources, and the revision of power operating schedules at the Chatuge and Nottely projects to benefit recreation uses of the lakes.

Twin-State Development Association, Inc. This association, covering Rabun County in Georgia and Graham, Jackson, Macon, and Swain Counties in North Carolina, was chartered by the Secretary of State of North Carolina in September 1965.

Walker-Catoosa-Dade Development Association, Inc. This association, covering Walker, Catoosa, and Dade counties in Georgia, was chartered by the Superior Court of Walker County in June 1966.

Industrial Development Authorities

Numerous local industrial development authorities have been formed to promote industrial development through acquisition, construction, sale, and lease of buildings, utilities, and transportation facilities financed by tax-exempt revenue bonds. These authorities have been formed by counties, municipalities, and jointly by counties and municipalities, either by individual constitutional amendment or under the "Industrial Development Authorities Law" of 1963 (*Ga. Code Ann.*, Chap. 69-15).

APPENDIX B

WATER AND RELATED LAND MANAGEMENT PROGRAMS IN GEORGIA

The water resources related programs in Georgia which are summarized for purposes of analysis in Chapter III of this report are described in more detail here. State and Federal program activities are defined and their interrelations identified. The format of this section is similar to that of Table 3 in which eight functional program areas are each considered to include data collection, planning, development, and operation activities.

Water Supply for Domestic, Municipal and Industrial Uses

Data Collection

The agency primarily responsible for collecting data on water resources quantity is the U. S. Geological Survey, which maintains statewide networks of streamflow measuring stations and groundwater observation wells. Financial support for this Federal program is provided by the State and by some local areas through the Department of Mines, Mining, and Geology. Additional financial support for this program comes from the Georgia Water Quality Control Board, the U. S. Army Corps of Engineers, the U. S. Soil Conservation Service, the Georgia Power Company and the Crisp County Power Company.

The topographic mapping program of the U. S. Geological Survey also contributes important data for water supply planning. The State supports this program financially through the Department of Mines, Mining, and Geology.

The U. S. Weather Bureau operates a statewide network of precipitation gages, which furnishes data useful in planning and operating water supply systems.

Since January 1970, the Water Supply Service of the State Health Department has required the submission of drilling logs and pumping tests from new water supply wells. This provides valuable information on the groundwater resources of the State.

Data on water quality are collected by several agencies. The U. S. Geological Survey conducts chemical and physical analyses of samples from two surface-water sites, from its network of groundwater observation wells, and from special studies such as those concerned with salt-water encroachment in coastal counties. These analyses generally identify dissolved mineral content, temperature, and sediment load of the tested waters. The Georgia Water Quality Control Board carries on an extensive water quality surveillance program in cooperation with several Federal and local agencies and industries. Although the program is designed to obtain information for pollution control, the data are generally applicable to planning and operating water-supply systems. The State Health Department Water Laboratory provides analytical services to the Water Quality Control Board and the Water Supply Service.

The Water Supply Service of the State Health Department collects operating data on the quality of public water supplies. It also maintains an inventory of public water-supply facilities.

Planning

The State of Georgia has no agency responsible for comprehensive water resources planning.

The planning of water supply facilities in Georgia remains the responsibility of the local government or private industry. Assistance may be obtained from Federal agencies or consulting engineers. River basin plans published by the U. S. Southeast River Basins Study Commission in 1963 included consideration of water supply requirements for much of the State. The U. S. Soil Conservation watershed planning teams consider municipal and industrial water supply in their multi-purpose project plans. Federally assisted local planning programs have included community water supplies in their public facilities planning. These programs are administered through the 17 area planning and development commissions and the Bureau of State Planning and Community Affairs. Tributary area development associations in the few Tennessee River basin counties have had the services of the TVA for water supply planning.

The most significant state planning activity related to water supply has been the establishment of water quality standards and stream classifications by the Water Quality Control Board. Stream classification, while considered a pollution control activity, essentially provides a planning framework for the use of streams for water supply and other purposes. Surface streams which will be considered acceptable for public water supply are so designated by this program, and, in establishing standards under the classification, the essential requirements for water treatment are implied. At present (1971) only interstate streams have been classified, but the board has indicated that it intends to also classify intrastate waters.

Development

The State does not engage in major water resources development programs, as do California, Texas and some other states. The Water Supply Service of the State Health Department regulates the construction of public water supplies, but only to provide for protection of public health. It must approve plans before construction begins and the completed system before operation begins. It issues rules and regulations for these purposes under the authority of the State Board of Health. State agencies do build and operate water supply systems to serve isolated state institutions such as parks, hospitals, and prisons.

Municipal and industrial water supply storage has been included in a number of reservoirs built by the U. S. Soil Conservation Service with local cooperation under the P. L. 566 program. Corps of Engineers' reservoirs in Georgia have not included this purpose directly. However, the regulation of river flows has greatly increased the reliable low flows downstream from these projects, and this is of great benefit to water users. Water supply benefits of Federal projects are reimbursable by the beneficiaries if provided for in direct project costs, but not when the benefit is incidental. Water users in Georgia have received these benefits from Corps projects without sharing the costs.

The riparian doctrine of water law applies to the use of surface waters of Georgia. Riparian land owners are entitled to reasonable use of the waters on their riparian land. The reasonableness of any use is determined in court by a jury.

Riparian rights are transferrable by prescription, license, or purchase. Municipalities and certain public utilities may condemn water rights under their power of eminent domain. Landowners may also collect and use diffuse surface waters which have not reached a natural channel and are thus not subject to the control of the State. Surface water supplies may thus be developed under several legal conditions all of which are subject to interpretation by the courts. Industrial water users are particularly handicapped in developing separate surface water supplies because their rights remain subject to the determination of reasonableness in Georgia courts.

Under Georgia's riparian doctrine, groundwater supplies may be developed without restriction unless it can be demonstrated that the groundwater flows in an underground stream, in which case the riparian doctrine of surface waters applies. In contrast to the severe restriction of surface water rights, groundwater rights are essentially unregulated.

Operation

The Water Supply Service of the Health Department requires the monthly submission of water samples for bacteriological testing from public water systems using surface supplies. The service has not had the resources to fully enforce this regulation. Several commercial laboratories in different regions of the State are being certified by the Water Supply Service to provide approved laboratory analysis for smaller treatment systems in order to improve their operation.

In 1969, legislation requiring state certification of water and waste-water treatment plant operators by 1972 was adopted. An examining board has been established in the office of the Secretary of State. It is expected that certification will contribute to obtaining more qualified treatment plant operators.

Water Pollution Control

Data Collection

The Georgia Water Quality Control Board is responsible for collecting data on waste treatment facilities, their operation, and the quality of the waters of the State. It cooperates with numerous agencies in the surveillance of water quality. Cooperating Federal agencies include the U. S. Geological Survey, the Corps of Engineers, The Environmental Protection Agency, and the Atomic Energy Commission. Cities and counties currently cooperate in operating sampling stations, as do several major industrial firms. The Board also collects data on the design, construction, cost and performance of waste treatment facilities.

The Southeastern Comprehensive Water Pollution Control Project of the Environmental Protection Agency has conducted extensive field surveys of water quality conditions in the major river basins of Georgia with cooperation from the Water Quality Control Board. A major objective of the project is the determination of dilution requirements of waste discharges.

The Georgia Game and Fish Commission investigates fish kills in cooperation with the Water Quality Control Board.

Planning

By classifying interstate waters and establishing standards of quality, the Georgia Water Quality Control Board has established a framework of objectives to guide water pollution control planning for those waters. These classifications and standards were adopted by the Board in April 1967 after ten public hearings and were submitted to the Secretary of the Interior for approval as required by the Federal Water Pollution Control Act of 1965. The Board has delayed classification of intrastate waters.

Local planning of public facilities, including sewerage systems and treatment facilities, can receive Federal financial assistance under the authority of the Federal Housing Act of 1954. This program is coordinated by the Bureau of State Planning and Community Affairs through the 17 area planning and development commissions.

Project plans of the Corps of Engineers and the Soil Conservation Service are submitted to the Water Quality Control Board for review and comment concerning effects on water quality.

Development

In order to legally discharge a waste effluent into the waters of the State, approval of plans for the collection and treatment facilities and, later, of the constructed facilities must be secured from the Water Quality Control Board. The Board processes applications from municipalities for Federal financial assistance in constructing waste treatment facilities under the P. L. 84-660 program. Federal funds have been insufficient to match applications for several years. The Water Quality Control Board has regularly sought a state appropriation for supplemental construction grants under a long-authorized but never-funded program. Construction programs have also been slowed recently by rapidly rising interest rates and inflation, which have upset cost estimates. Additional Federal grants have been available to local governments under the Appalachian Redevelopment Act and the Consolidated Farmers Home Administration Act. The Water Quality Control Board has helped coordinate these programs for construction of sewerage systems and treatment facilities. Federal assistance from the Department of Housing and Urban Development and the Department of Commerce is coordinated by the Bureau of State Planning and Community Affairs.

The installation of individual septic tanks is regulated by the State Health Department.

Uncertainty over the riparian rights of water users to discharge wastes into streams and of downstream users to have protection from unreasonable pollution has been greatly reduced by the actions of the Water Quality Control Board. These actions have generally superseded the right of an injured or potentially injured party to sue a water polluter for trespass, and they have effectively replaced the requirement that a jury define the "reasonableness" of pollution by providing specific administrative requirements subject to judicial review.

Operation

Inadequate operation of waste treatment facilities is a severe problem in Georgia. The Water Quality Control Board conducts short schools for training treatment plant operators twice a year. It has contracted with the U. S. Department of Labor to provide a combination of on-the-job and classroom training for operators. Area technical schools have offered training courses of various types for operators. The 1969 legislature adopted the Water and Wastewater Treatment Plant Operator Act which will require certification of operators by a State examining board after July 1, 1972.

Water Quality Control Board engineers inspect municipal and domestic waste treatment facilities. One function of the Water Quality Surveys Service of the Board is to monitor the operation of treatment facilities.

Certain multi-purpose dams are operated to provide dilution of waste discharges. For instance, the peak power releases from Buford Dam on the Chattahoochee are reregulated at Morgan Falls Dam to provide dilution of waste discharges from Atlanta. Cooperation of the Corps of Engineers, the Georgia Power Company, and the City of Atlanta is required.

Agricultural Land and Water Use

Data Collection

The Georgia State Soil and Water Conservation Committee compiles inventories of the State's soil and water conservation needs. The State Department of Agriculture collects market information on crop production and sales. The Georgia Forestry Commission inventories the pulp and sawtimber resources and forest lands of the State. Various agencies of the U. S. Department of Agriculture collect information on agricultural land and water use.

Planning

The State supports one of the most active small watershed planning programs in the country through appropriations to support watershed planning teams of the Soil Conservation Service. This program is promoted by the State Soil and Water Conservation Committee.

Development

Small watershed development projects of the Soil Conservation Service require material contributions of land and funds from local participants. These projects are sponsored by soil and water conservation districts, which coordinate arrangements for meeting the local obligations. These projects have included provisions for flood protection, drainage, erosion control, sediment control, municipal and industrial water supply, recreation, fish and wildlife, and irrigation water supply.

The drought of 1954 was particularly damaging to farmers in Georgia, and it caused widespread discussion of the need for modification of water rights law to allow the development of supplemental irrigation systems. Under current riparian doctrine an irrigator can legally use only diffused surface water collected and stored on his own land or percolating ground-water. Consumptive use, such as irrigation, is not likely to be viewed as reasonable under the strict riparian doctrine of Georgia. This determination is up to a jury, however, on a case-by-case basis. No basic modification of water rights law has been achieved to date.

Operation

Small watershed projects built under the P. L. 566 program are operated by the local soil and water conservation districts.

The Forestry Commission operates a statewide fire prevention and control program for forest and other rural areas with financial contributions from the counties. It also grows nursery stock for reforestation of burned and cutover areas and lands put into the soil bank.

Fish and Wildlife

Data Collection

General statistics on fish and wildlife programs in Georgia are collected by the Game and Fish Commission. Fish kills are investigated by the Commission in cooperation with the Water Quality Control Board and Federal agencies.

Planning

The planning of multi-purpose water developments by Federal agencies usually includes consideration of fish and wildlife requirements. The Soil Conservation Service particularly considers such values in watershed planning. The Georgia Game and Fish Commission reviews project plans of the Soil Conservation Service and the Corps of Engineers and comments on fish and game considerations.

Water quality requirements for fish were a major consideration in the establishment of water quality standards by the Water Quality Control Board and one classification category is "Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life."

The State Natural Areas Council is charged with identifying and designating suitable areas for nature study and appreciation to be preserved by State and Federal agencies. In discharging this duty the Council plans for the preservation of unique fish and wildlife areas. The Council also administers the Georgia Scenic Rivers Act of 1969, under which it recommends to the legislature a system of scenic rivers for preservation. Development of these rivers and adjoining lands would be limited to uses considered compatible with the degree of wilderness preservation designated.

The Coastal Marshlands Protection Agency of the Game and Fish Commission has been charged with formulating and enforcing rules and regulations for restricting construction in the salt marshes. A major objective of the agency is the preservation of fish and wildlife, particularly commercially valuable shell and fin fish breeding and feeding areas.

Development

Nearly all impoundments in the State are stocked for fishing. Included are large lakes and reservoirs constructed by the Corps of Engineers, TVA, the Georgia Power Company, the Soil Conservation Service, the State Parks Department, and the Crisp County Power Authority. The Game and Fish Commission is constructing about 150 boat ramps for access to streams and impoundments by fisherman. This program is supported by Federal funds from the Land and Water Conservation Fund and by local governments which provide land and rights-of-way. The Soil Conservation Service assists local governments in constructing boat ramps on P.L. 566 projects.

The Game and Fish Commission has authority to require the construction of fishways in dams or fresh water streams. A survey of the possible need for fishways in existing structures would be necessary to determine whether this authority should be invoked.

Operation

Hatcheries operated by the Game and Fish Commission supply fish for stocking public and private waters of the State. The Commission secures the cooperation of major reservoir operators in modifying power generating schedules to protect spawning fish and in moderating reservoir drawdown to accommodate fishermen.

Fishing and hunting are regulated by the Game and Fish Commission through the sale of licenses and enforcement of regulations by its uniformed officers.

In cooperation with the Water Quality Control Board and Federal agencies, the Commission is authorized to close areas to fishing if a hazard to public health is demonstrated. Such action has been required on occasion because of coliform pollution of shellfish beds in coastal and estuarine areas. The discovery of mercury pollution in rivers downstream from certain industrial plants led to the restriction of fishing in those areas.

Recreation

Data Collection

The State Parks Department collects information on park visitation and user activities. Corps of Engineers' reservoirs attract large numbers of visitors to their public recreation areas, and the Corps collects data on this usage. The State Soil and Water Conservation Committee inventories State conservation needs for water-oriented recreation and other purposes. The Georgia Recreation Council has developed information on the recreational potential of water resources, such as canoeing and float trip routes, not usually considered by other agencies.

Planning

The Bureau of State Planning and Community Affairs has been particularly active in outdoor recreation planning. This activity has been stimulated by Federal assistance programs of the Bureau of Outdoor Recreation under the Land and Water Conservation Fund. Inventories of needs and existing resources have been assembled. The Bureau of State Planning and Community Affairs has cooperated with planners of the State Parks Department and local governments, including the area planning and development commissions. The major reservoir building agencies consider recreation increasingly important in planning projects. These agencies include the Corps of Engineers, the Soil Conservation Service, and the Georgia Power Company.

The Georgia Natural Areas Council has been charged with administering the Georgia Scenic Rivers Act of 1969 under which a system of freeflowing streams may be preserved for recreation and nature study. The Council studies river reaches suitable for such purposes and recommends those which should be designated as scenic rivers by the General Assembly.

Development

General state park development is financed largely through the Jekyll Island--State Park Authority which acts as a branch of the State Parks Department, although it is actually a public authority. Similarly, the Stone Mountain Authority and the Lake Lanier Island Development Authority are developing state parks at those locations. The State Parks Department develops some parks with State-appropriated funds, and it leases additional facilities from these public authorities.

The most intensive development of water-oriented recreation facilities has been by the Corps of Engineers on Federal reservoirs. The Corps also leases reservoir lands to the State and to private parties for development.

Power company reservoirs have also been developed for recreation, but not as extensively as have Federal reservoirs. The boat ramp construction program of the Game and Fish Commission is aimed at opening these reservoirs and other State waters more fully to public recreational boating and fishing.

Operation

The State Parks Department operates a system of 44 state parks, in many of which water-oriented recreation is a major activity. The Jekyll Island Authority and the Stone Mountain Memorial Association operate two more state parks.

Boating is regulated by the Game and Fish Commission, which enforces motorboat registration requirements, and by the Water Quality Control Board, which requires on-board treatment devices for boat toilets.

Flood Control and Drainage

Data Collection

Federal agencies conduct nearly all data collection related to flood control in Georgia. The Geological Survey measures flood flows in cooperation with other agencies including the State Highway Department and several local governments. The Corps of Engineers and the Soil Conservation Service collect information on flood damage and delineate the extent of flood plains.

Planning

The watershed planning teams of the Soil Conservation Service, which plan flood control measures on small streams, receive substantial State financial support. The Corps of Engineers conducts flood plain studies for local governments upon request. This activity has been accelerated by the requirements of the

Federal Flood Insurance Act, under which 100-year flood limits must be established to identify areas in which land use must be regulated as part of the eligibility requirements. This activity is in addition to the more traditional studies, in which the Corps determines the economic and engineering feasibility of proposed local flood protection projects. As one of its continuing activities, the Corps also plans for flood control in major river basins.

The Game and Fish Commission has opposed some drainage and channel improvement aspects of P. L. 566 projects because of suspected adverse effects on fish and wildlife habitat. The Commission's staff reviews project plans of the development agencies.

Development and Operation

Small watershed projects are constructed under P. L. 534 and P. L. 566 programs by the Soil Conservation Service in cooperation with local soil and water conservation districts in the State. Major flood control works have been constructed by the Corps of Engineers in the Chattahoochee, Coosa, and Savannah River basins and by the TVA in the Tennessee basin. Local flood protection works have been built cooperatively with the Corps by the cities of Augusta, Macon, Rome, and Columbus.

Several State agencies have been organized to promote river basin development including flood control. These are the Waterways Commission and the two river basin development commissions for the Chattahoochee and Altamaha. Of these, only the Altamaha Commission has been provided State funds for a full-time staff.

The construction of highways involves extensive consideration of drainage requirements and the effects of flooding. The State Highway Department is actively engaged in the design and construction of culverts and other drainage works.

The National Weather Service forecasts floods on major river systems and issues flood warnings.

Navigation

Data Collection

The State Ports Authority and the Corps of Engineers collect data on navigation activity.

Planning

The Corps of Engineers is the major navigation planning agency in the State. The Bureau of State Planning and Community Affairs has included waterways in its statewide transportation planning studies.

The Georgia Waterways Commission and the Chattahoochee River Basin Development Commission have promoted planning and development of navigation facilities on Georgia rivers, particularly the extension of navigation on the Chattachoochee to Atlanta. The newly established Altamaha River Basin Commission is authorized to study navigation in that basin.

Development and Operation

The State Ports Authority constructs and operates dock and warehouse facilities at river and ocean ports. The Corps of Engineers dredges channels, canals, and harbors and constructs and operates locks and river regulating dams for navigation. It plans its dredging operations with the Water Quality Control

Board in an effort to minimize water pollution.

Electric Power Generation

Data Collection

Data on electric power demand, generation, distribution, and rates are collected by the power companies, the TVA, the Corps of Engineers, the Federal Power Commission, the Southeast Power Administration, and the Georgia Public Service Commission. Data on stream flow, collected by the Geological Survey, and on water quality, collected by the Water Quality Control Board, provide information for planning and operating generating facilities.

Planning

Planning of large hydroelectric generation facilities is carried out by the Corps of Engineers and the Georgia Power Company. Most sites which are likely to be developed for hydroelectric power have been identified and studied. Thermal generating plants utilizing either fossil or nuclear fuel have become significant considerations in water resources planning because of their rapid growth in size and the resulting large cooling water requirements. The Water Quality Control Board has established temperature standards which effect the design and location of thermal generating plants.

Development

The State does not participate directly in development of electric power generation facilities. It has granted power companies the right of eminent domain for condemning property rights necessary for the development of generating facilities and the acquisition of rights-of-way.

Operation

Various State agencies have suggested modifications to the power generation operations of large impoundments in order to achieve other benefits. These actions include maintaining higher reservoir levels during peak recreation seasons and the regulation of discharges to improve downstream water quality.

Planning

State Planning

State planning in Georgia has been impelled by two major forces, the State's need for economic development and the incentives and requirements of Federal assistance programs for functional planning. The State's planning effort was divided along these lines when the Planning Division of the Department of Industry and Trade became the nucleus of a new State Planning and Programming Bureau in 1967. The programs aimed at economic development through promotion of industrial growth and tourism remained in the Department of Industry and Trade. Programs tied to Federal planning assistance moved to the Bureau. In 1967, these programs included urban planning assistance under Section 701 of the Federal Housing Act of 1954, Appalachian Regional planning, Southeast Coastal Plains planning, cooperation with the Economic Development Administration of the Department of Commerce, and outdoor recreation planning under the Federal Land and Water Conservation Fund Act of 1965. A water resources planning effort was started in 1968 to take advantage of Federal aid under the Federal Water Resources Planning Act of 1965. The 1970 act reorganizing the Bureau and changing its name to the Bureau of State Planning and Community Affairs was partially in response to requirements of the Federal Intergovernmental Cooperation Act of 1968 and U. S. Bureau of the Budget circulars concerning procedures for handling grants-in-aid to cities.

Water Resources Planning

Regional or statewide water resources planning programs of various types have met with very limited success in Georgia. The Georgia Water Law Revision Commission of 1955 recommended the establishment of a Water Resources Commission which would engage in comprehensive water resources planning. The Water Resources Commission was never implemented, although statutory authority for it existed for several years. Meanwhile, the U. S. Study Commission--Southeast River Basins was authorized in 1958 to prepare a comprehensive land and water development plan that would cover most of Georgia and portions of adjoining states. The plan was completed in 1963 and the Study Commission disbanded. In order to promote continuing planning in the Southeast River Basins, the interstate Resources Advisory Board was formed in 1964 with Georgia a member. Federal agencies also formed the Southeast Basins Inter-agency Committee to coordinate state and Federal water resources planning. Both efforts have been limited by ineffective state participation.

The 1968 pre-planning effort by the State Planning Bureau yielded a set of recommendations for water resources planning. Its report entitled, Georgia Water Resources Planning, Part VI, Needs and Recommendations, contain an excellent summary of basic responsibilities of the State in water resources planning and a detailed outline for guiding a water resources planning program leading to development of a state water plan. The recommendations have not been implemented.

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ENVIRONMENTAL RESOURCES CENTER

The Environmental Resources Center at the Georgia Institute of Technology was established in March 1970 by action of the Board of Regents. It is the successor to the Water Resources Center, which was established in 1963. The purpose of the Center is to initiate, facilitate, and coordinate efforts designed to bring the full competence of the Institute to bear on all facets of environmental resources education and research. Its activities and policies are developed and carried out under the guidance of the Advisory Council, which is composed of the administrative officers listed below. Contacts with related research and training programs are maintained through School Directors and Department Heads, with assistance from ad hoc task committees composed of faculty and staff representatives.

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